# CHEMICAL MARKETS

VOLUME XXV | ESTABLISHED 1914 | NUMBER 6

## Contents for December, 1929





CHEMICAL MARKETS, INC., Publishers

Publication Office, 28 Renne Ave., Pittsfield, Mass. Editorial and General Office, 25 Spruce St. New York City

WILLIAMS HAYNES, PRESIDENT; D. O. HAYNES, JR., VICE-PRESIDENT; WILLIAM F. GEORGE, SECRETARY-TREASURER

PUBLISHED ON THE TENTH DAY OF EACH MONTH AT PITTSFIELD, MASS. SUBSCRIPTION TWO DOLLARS A YEAR, IN ADVANCE, POSTPAID TO ALL COUNTRIES; SINGLE COPIES, CURRENT ISSUE, 25 CENTS; BACK COPIES, 50 CENTS EACH. NOTICE OF THREE WEEKS IS NECESSARY TO CHANGE SUBSCRIBER'S ADDRESS AND IN WRITING PLEASE GIVE BOTH THE OLD AND NEW ADDRESSES. PRINTED FOR THE PUBLISHERS BY THE SUN PRINTING COMPANY, PITTSFIELD, MASS. ENTERED AS SECOND CLASS MATTER, JANUARY 1, 1928 AT THE POST OFFICE AT PITTSFIELD, MASS., UNDER THE ACT OF MARCH 3, 1879.

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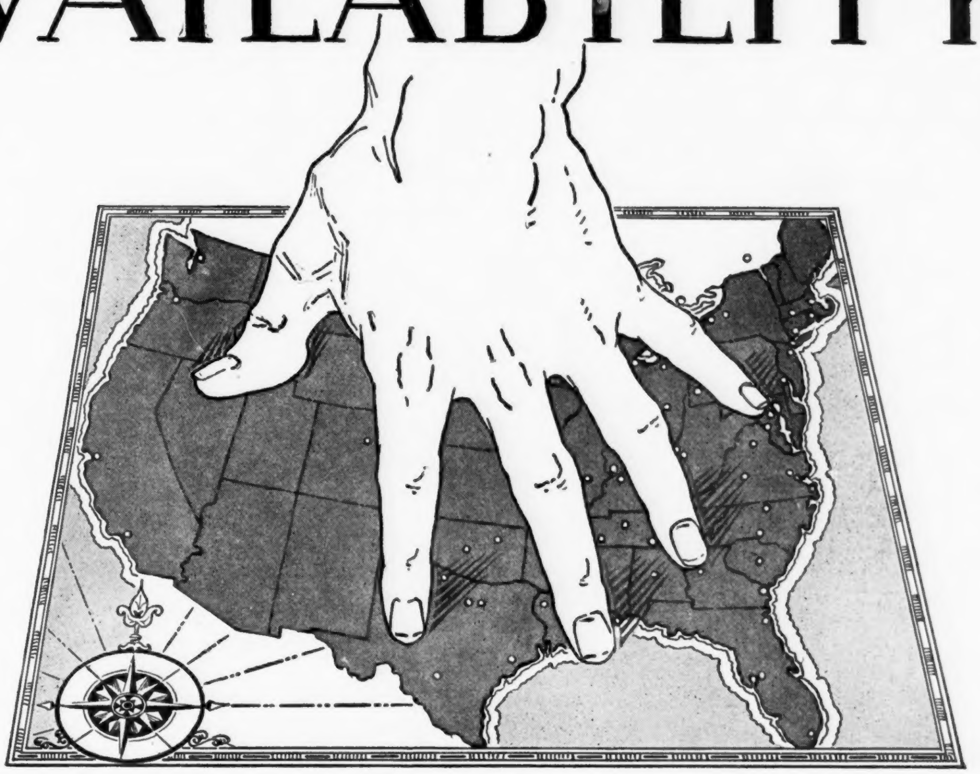
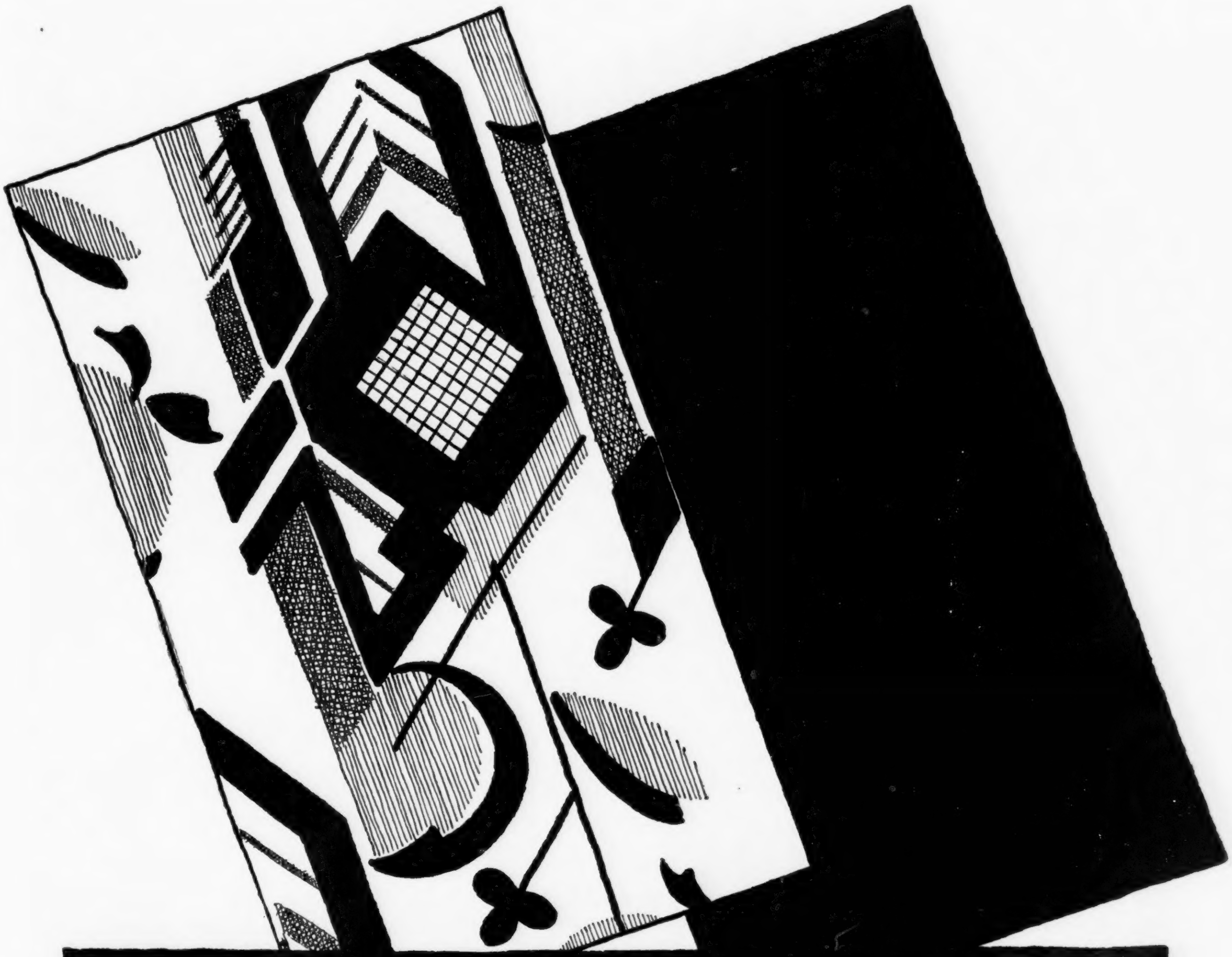




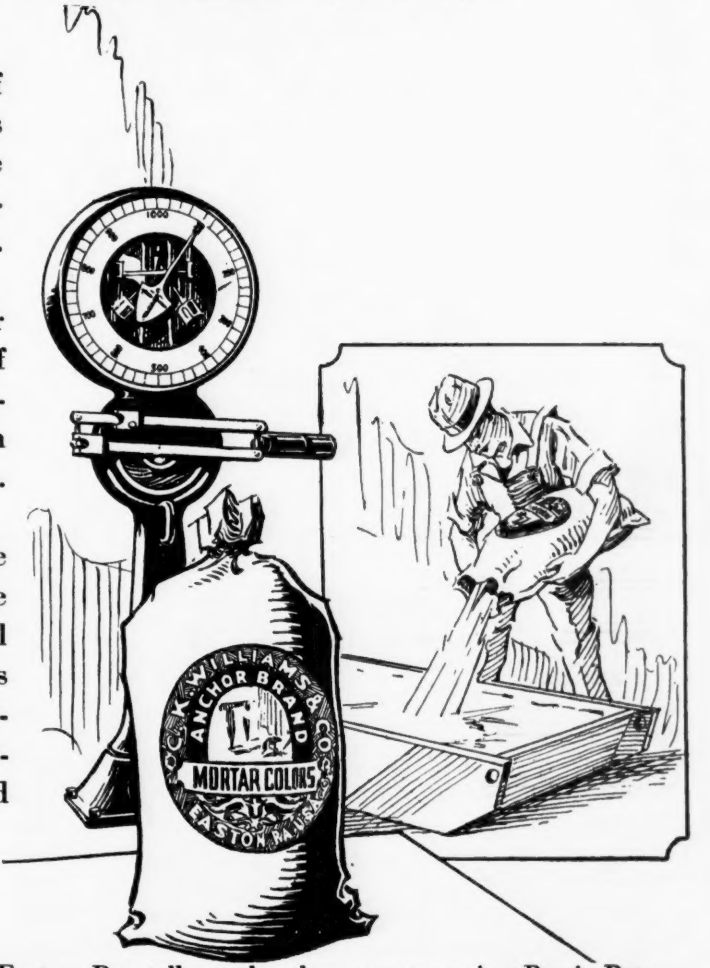
SINCE 1858, THE WORLD'S LARGEST MAKERS OF QUALITY BAGS

# "A series of experiments proved...

**I** ... that the use of these bags makes for economy of storage space to both the shipper and the customer.

**II** ... it makes for greater ease of handling, in loading, unloading, and in storing in customers' warehouses.

**III** ... we are able to pack the exact weight of material the customer requires per batch of his product, eliminating the necessity of scooping and weighing."




In these words, C. K. Williams & Co. of Easton, Pa., tell us why they are now using Bemis Bags to ship their dry colors and fillers. They also say, "An added advantage is that of protection from the weather." Many hundreds of different products are shipped with just such economy and safety in Bemis Bags. How about yours? Get the advice of our Packaging Engineer without obligation. Address Bemis Bro. Bag Co., 407 Poplar St., St. Louis, Mo.

# BEMIS BAGS

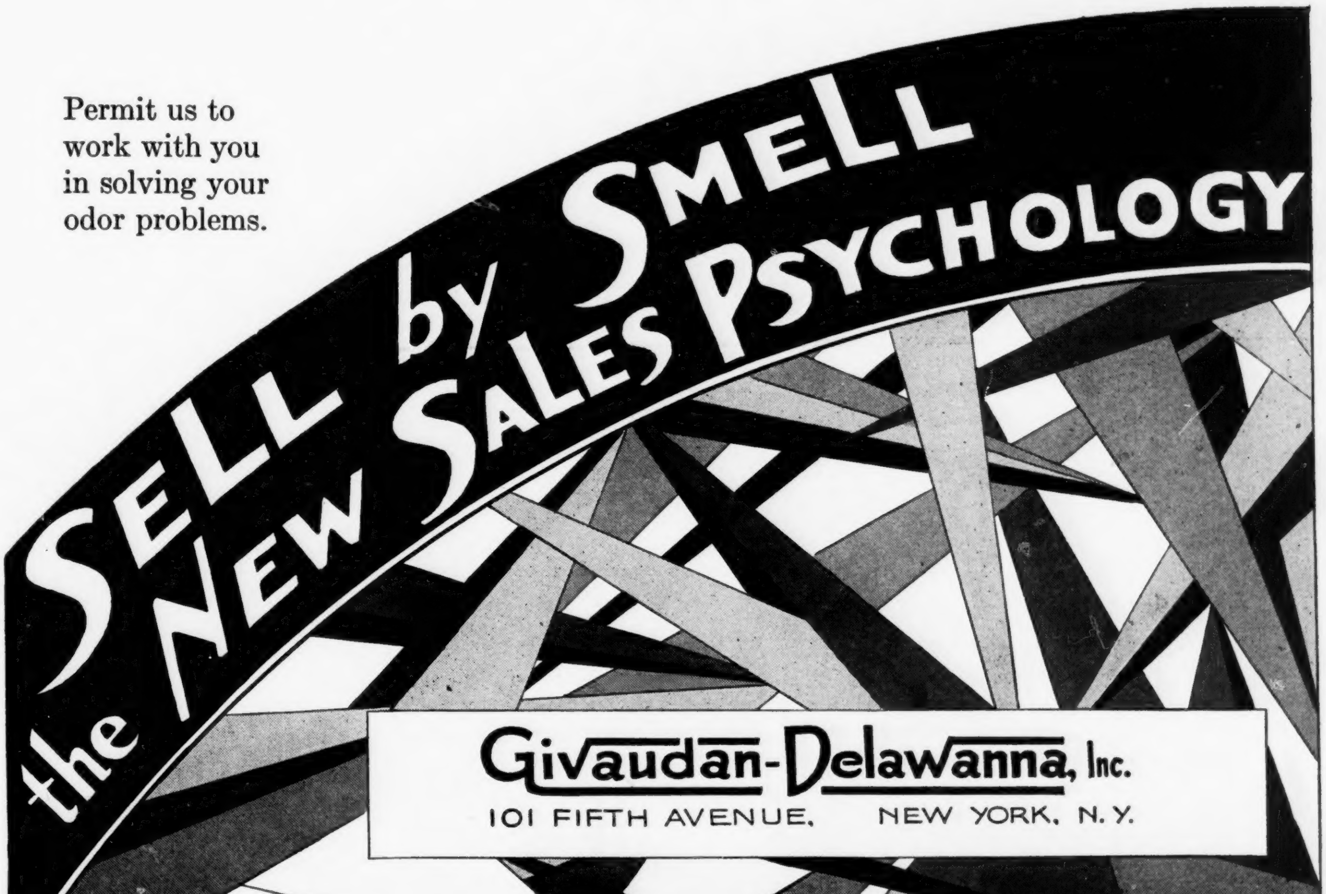
TWINES AND THREADS FOR BAG CLOSING NR709

# *The* **V***erdict is in!*

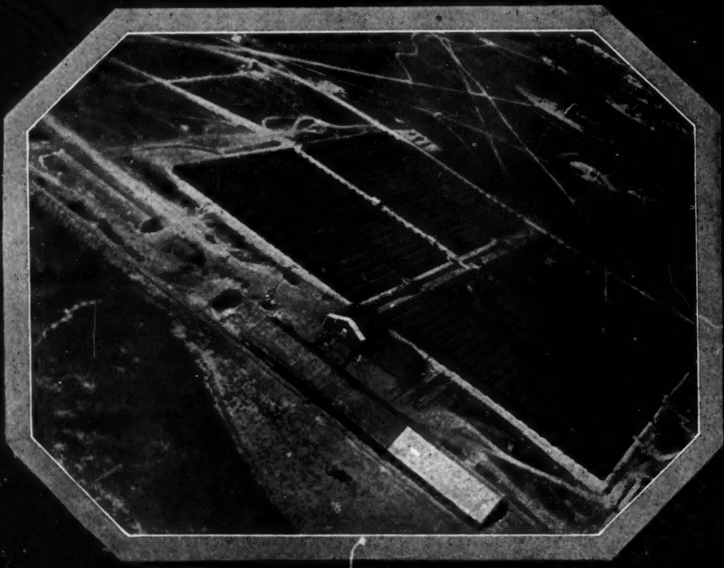
## Merchandise with unpleasant odors must be corrected to increase volume of sales.

*This astonishing fact is proven daily in our nation-wide survey of products that demand improved odors--the preference is for "pleasant odor" merchandise, every time.*

Permit us to work with you in solving your odor problems.



# CERTIFIED
# CARBON BLACK



Schafer plant taken in the Fall of 1928 before the addition of the special fifth unit for producing color blacks.

CABOT Certified Carbon Black is accepted as the new measurement of quality.

**Godfrey L. Cabot, Inc.**
**940 Old South Bldg., Boston, Mass.**

# The New Requirements Point to

# METHANOL

ARE your customers demanding higher purities, quicker deliveries, lower costs? Is the answer in your case—a cheaper, quicker process or some short-cut to higher production? Are your competitors putting themselves in a better position to meet the new requirements of industry? Can you use pure Methanol to advantage in some process?

To-day it is the far-sighted manufacturers who are considering these questions—tomorrow or a year from now they may have important advantages because they early recognized to-day's opportunities.

Pure synthetic Methanol is assuming a new importance in the chemical process industries. This development is significant for it will bring important replacements and economies in the manufacture of a multitude of products. As a raw material used in the manufacture of organic chemicals, as a commercial solvent and anti-freeze, Methanol is well-known—but its wider future applications are still buried or just coming to light in a thousand plants throughout the country.

To-day it will pay to think in terms of pure Methanol.

We invite your inquiries.

**METHANOL**

**ANHYDROUS AMMONIA**

**SODIUM FORMATE**

DU PONT
REG. U.S. PAT. OFF.

MAIN OFFICE: WILMINGTON, DELAWARE
PLANT: BELLE (CHARLESTON), WEST VIRGINIA

# DuPont Ammonia Corporation

*Formerly*: LAZOTE, Inc.

# CHEMICAL MARKETS

VOL. XXV | DECEMBER, 1929 | No. 6.

## What Do You Sell?

YOUR customers do not buy chemicals: they purchase either a raw material or the means of carrying on some chemical reaction necessary to the production of the goods they make to sell. The point of view of the consumer is, of necessity, quite different from that of the producer. To them chemicals are but the means to an end.

FOR a moment let us look at chemicals in this light, which should, of course, be the guiding beacon in chemical sales policies. For as that capital authority on merchandizing, St. Elmo Lewis recently said, "It doesn't make the tiniest, little bit of difference what you think about your own product or what opinion you may hold about your customers; but it is all important how they regard you and your goods."

THAT people do not buy goods, but the utilities and the satisfactions which these goods offer them, is a fact obviously true, but easily overlooked. Clever automobile salesmen actually talk of "buying transportation" and their advertising is shrewdly planned to create pride in ownership of their car. In the field of industrial raw materials this direct appeal to the purpose of the purchase is even more strong. Rather remarkably it is even less used. In reality the sale of chemicals is technical service.

SALES competition upon the price appeal is the root of most evil in chemical merchandizing. It is the obvious appeal, for the industrial buyer is ever eager to cut costs. But this appeal has done much to keep chemicals, which are a manufactured article, upon a commodity basis of merchandizing. It has all but obliterated slight, but distinguishing differences in chemicals of different manufacturers, for the natural retort of the price salesman is that his goods are the same quality as his competitors' and a little cheaper.

MOST chemicals have many uses for which the technical requirements are not identical. Many new uses for chemicals are opening up. Manufacturing processes employing chemicals are being subjected to more and more exact scientific control. Accordingly, there is an increasing opportunity for specialized use of chemicals based upon slight differences of analysis, of physical form, of container. Such distinctions should be jealously guarded as the distinguishing features of a brand. A big part of our research program should be devoted to uses of our products with the view of determining our best markets and emphasizing the distinctive peculiarities of our chemical wares.

## Whistle or Whisky

There are two time honored methods of keeping up one's courage: to whistle bravely and to down a stiff hooker o'rum. The first is chiefly useful in diverting a lively imagination over-apt to be haunted by ghosts. The second stimulates action which, while it may be foolhardy, is nevertheless a fine antidote to danger.

Both these methods have been liberally applied to allaying the fear that Wall Street's earthquake might crack the stability of general business. Neither appeals to us particularly as a reasonable way of approaching this complex problem. We have therefore, resisted the perfectly human temptation to telegraph the leaders of our chemical industries for statements for publication. This sort of thing has been so overdone that it creates a reaction either of suspicion or of false hope—a whistle or a whisky.

In the midst of crashing stock prices three of our staff left New York—one eastward, one south, one west—and after visiting the chief centers of chemical consumption from Boston, to Atlanta, to St. Louis, they met again in Chicago. Each had sought to uncover, not the theories, but the facts about the condition of the chemical market. A consensus of their findings can be summed up in three sentences. Current chemical deliveries have kept up in volume. Contract signing is a bit slower than last season, but not so slow as two years ago, while quantities on requirement contracts have not, in the main, been reduced. Among the consuming industries only lacquer and rayon are definitely slowing up, and the latter is most likely due to over-production dating back several months.

These reports do not picture the usual symptoms of a nation-wide slump. Nor are the basic facts behind the present situation—which have sometimes been buried beneath a heap of optimistic opinions—of a pessimistic tinge.

In neither trade nor industry are there big inventories either of goods or of raw materials. The financial position of both banks and corporations is sound—in fact, both groups have for months been lending money, at fancy interest rates and well covered by collateral, for stock brokers' accounts. This cash has returned and is available for expansion programs or for sound investment. Our price level does not need deflating. Many dollars lost represent paper profits, and the real buying power of many ex-speculators is substantially unimpaired, since they are living on wages currently earned. In the main agriculture, which is after all our greatest industry, is quite unaffected by the speculative orgy; its morale is considerably stiffened of late, and crops and prices both indicate that our farm population will be better off than in many years past.

Last, but not least, we are exceedingly fortunate in having for our President not a politician willing to drift, but an engineer ready to direct. Mr. Hoover's actions are significant. He is working with and for industry, not because he eschews the financial interests, but because he plainly believes that there is no serious financial difficulty. His program of public works—a long cherished and carefully thought out plan of his—is practical; so practical indeed that it enlists the support even of his political rivals. It is moreover, a splendid nerve tonic better than whistling past the graveyard or toting a flask to the next director's meeting.

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## The Common Good

In making his proposal of a million dollar Institute for the fertilizer group, Mr. Rowell takes a very constructive step towards a long-sought-for solution to the sales problems of the fertilizer industry. He decries the sales promotion of this fertilizer or material by belittling that other one. He points out that the only result of such tactics is the complete confusion of dealer and farmer with an ultimate loss to the members of the fertilizer industry individually and collectively. He advocates co-operation in an effort to increase fertilizer consumption by working with those who reach the ultimate consumer as well as with the ultimate consumer himself.

Not only is this the biggest Institute budget ever proposed within the chemicalized industries, but it has also the distinction of being the first chemical organization to gather together in one body suppliers of the raw materials as well as of the finished product. His plan is also parallel to the effort made within the soap industry to get the producers of chemicals to co-operate with those who deal with the ultimate consumer.

The entire chemical industry will watch with interest the working out of this ambitious program. It is based on sound economics, since increased buying of the finished product by the consumer means proportional increases all along the line. His proposal also is attuned to the newer psychology of co-operation rather than competition in industry.

Proper chemical marketing methods are a continued problem and it is to be hoped that the fertilizer industry meets with success in this effort, so that the way may be blazed for further co-operation for the common good within the chemical industries.

## Another Contract Season

Reports from the contract season for chemicals were awaited with unusual interest this season. There were two added factors present for heightening the always keen attention with which this closing of business for the coming year is checked up. In the first place, 1929 had been one of the biggest and best years in the history of the chemical industry, exceeding in activity and volume everything but the peak years of the War. In the second place, this busy season followed hard on the crash in the securities market. Could 1930 business in chemicals possibly exceed that of 1929 in the face of this not particularly favorable development?

Although the final answer is not yet known, preliminary reports seem to indicate that renewals of contract are coming through in most satisfactory fashion. The most reliable indicators of the condition of the industry generally are usually conceded to be soda ash and caustic. It is reported that contracts to date in these alkalis are from two to three per cent ahead of last year at this time. Just at present, this seems to be typical of the chemical situation with the exception of those materials going to the automobile and rayon industries. With these exceptions shipments are going forward normally, withdrawals against contracts are proceeding on schedule, and business contracted for the coming year tends to be as well advanced as at this time last year.

## Quotation Marks

Of the industrial outlets for benzol, it is doubtful whether the increase that may be anticipated in its use by the chemical industries either as a raw material or as a solvent will be able to take care of more than a small part of the greater output anticipated, so that the whole commercial future of benzol seems bound up with its success as a fuel for internal combustion engines either in admixture with petrol or alone.—*Chemical Trade Journal.*

The business interests of the nation should be strong enough to protect it and themselves by depriving Congress of the tariff making power and by placing it with a court of judicial character.—*Textile Colorist.*

The industrial prominence into which the direct ammonia process of nitrogen fixation has brought hydrogen gas has now been enhanced by the introduction of the coal hydrogenation processes and it would not be too much of an exaggeration to say that the supply of cheap and pure hydrogen is now one of the foremost factors of chemical industry.—*Industrial Chemist.*

A vast amount of research still faces metallurgists, but eventually there will be a great number of new gases brought into use. When that time is reached it may be possible to go even further than surface treatment of steels and change the inner structure through treatment at low temperature with gases.—*Robert G. Guthrie.*

The wide-awake firms in every field are turning to the chemical engineer and the research laboratory for all the help they can get. Any firm that is to weather to-morrow's competition must be up-to-the-minute in point of chemistry or it will soon be a yesterday's business.—*Business Chemistry.*

New industries grow rapidly, as is indicated by the fact that the output of the 22 different manufacturers of mechanical refrigerators exceeds $100,000,000.—*Oakite News Service.*

## *Ten Years Ago*

**(From our issues of December, 1919)**

James J. Riley was elected president of the Rollin Chemical Co., Charleston, W. Va., succeeding Hugh Rollin, resigned.

National Aniline & Chemical Co., Inc., announced that it would sell only products of its own manufacture.

General Chemical Co. purchases Western Chemical Co., Denver, capitalized at $2,000,000.

Norman Peterkin, formerly with the sales staff of General Chemical Co., became associated with United Piece Dye Works, Lodi, N. J., as purchasing agent.

Atmospheric Nitrogen Corp. was chartered in Manhattan with capital of $5,000,000 to manufacture chemicals and air products. Incorporators were E. L. Pierce, H. H. Handy and H. Otis of Syracuse.

Vanadium Corp. completed negotiations for the purchase of the Primos Chemical Co.

Cronkhite Co., Boston, purchased chemical and dyestuff interests of J. A. and W. Bird.

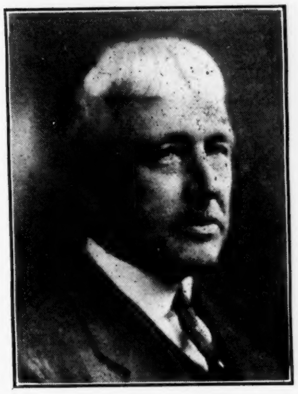
Hooker Electrochemical Co. moved to 25 Pine st., New York.

Southern Phosphate Corp. chartered in Delaware with capital of $30,000,000.

William H. Rankin, one of the founders of the Barrett Co., died in Florida.

# *Contributions of Chemicals to the* Refrigeration Industry

By John B. Churchill



PRIOR to 1925 the only chemicals used as refrigerants were ammonia and carbon dioxide. Since that date the enormous growth of the so-called "household" refrigeration industry has developed a demand for other refrigerants more suitable for use with the smaller type of machine. Our chemical industries with their increasing demand for low temperature refrigeration and the application of refrigeration to industrial air conditioning have also created a market for different refrigerants, other than ammonia and carbon dioxide.

### Many Chemicals Produce Low Temperatures

A review of the history and the development of the refrigeration industry would show that a large number of chemical substances have been used for the production of low temperatures. In the broadest sense of the word, all such compounds might be termed refrigerants. The present paper however, will concern itself exclusively to those chemical substances which have the necessary physical properties to allow them to take up heat on being evaporated at low temperatures and pressures, and to discharge the same quantity of heat when compressed to a liquid under higher temperatures and pressures.

A very limited number of the millions of chemical compounds known, have the necessary physical properties to be used as refrigerants and as these represent the compounds of the simplest chemical composition, all of them have been long known and their properties most perfectly studied. It would be exceedingly improbable that any new compounds will be discovered having properties which would render them suitable for a commercial refrigerant.

Looking back over the development of commercial refrigeration we find that some 30 to 40 substances or mixtures have been at one time or another used for the purpose of a refrigerant in various types of the compression or absorption machine. Experience has shown however, that many of these had properties which rendered them unfit for commercial refrigeration and we find the list narrowed to a comparatively few substances to which we might apply the term of "commercial refrigerant." These are as follows: air, water, carbon dioxide, ammonia, sulfur dioxide, methyl chloride, ethyl chloride, ethane, propane, butane, iso butane, dichlor methane, dichlor ethylene, trichlor ethylene.

### Production of Commercial Refrigerants

At the present time about 30-40 firms are manufacturing refrigerating machinery using ammonia; about 10 are using carbon dioxide and with a few exceptions these are all large capacity units intended for commercial refrigeration such as cold storage and the manufacture of ice. In the strictly household or domestic division of the refrigeration field about 30 manufacturers are producing methyl chloride machines; 30-35 are using sulfur dioxide, one using air, two water and one iso butane. A few other firms are using special refrigerants to which they give trade names, but their produc-

| Vapor or gas | Kills most animals in a very short time | | Dangerous in 30 to 60 minutes | | Maximum amount for 60 minutes without serious disturbances | | Slight symptoms after several hours or maximum amount for prolonged exposure | |
|---|---|---|---|---|---|---|---|---|
| | Per cent by volume | Relative order | Per cent by volume | Relative order | Per cent by volume | Relative order | Per cent by volume | Relative order |
| Phosgene | 0.02-0.05 | 1 | 0.0025 | 1 | No data. | 0 | 0.0001 | 1 |
| Chlorine | .10 | 2 | [1,2].004-.006 | 2 | 0.0004 | 2 | .0001 | 1 |
| Bromine | .1 | 3 | .004-.006 | 3 | .0004 | 3 | .0001 | 1 |
| Hydrogen sulphide | [2].06-.10<br>[1].1-.20<br>[3].1-.30 | 4 | [1,2].05-.07 | 6 | .02-.03 | 7 | [1].01-.015<br>[3].02 | 7 |
| Hydrocyanic acid | [3].048 | 5 | [1,2].012-.015 | 4 | .005-.006 | 4 | .002-.004 | 3 |
| Hydrogen chloride | [1].1-.2<br>[3].5 | 6 | .15-.2 | 7 | .005-.01 | 5 | .001-.005 | 4 |
| Sulphur dioxide | [3].2 | 7 | .04-.05 | 5 | [1].005-.02 | 6 | [3].01<br>[3].001 | [4]2 |
| Carbon monoxide | [3].5-1 | 8 | .2-.3<br>.2 | 8 | [3].05-.10<br>[1].05 | 9 | [1].05<br>[3].04 | 9 |
| Ammonia | 5-1 | 9 | .25-.45 | 10 | [3].03 | 8 | [1].01 | 6 |
| Benzene | 1.9 | 10 | No data. | | 31-.47 | 11 | [3].15-.31 | 13 |
| Gasoline | 2.4 | 11 | 1.1-2.2 | 11 | .43-.71 | 14 | No data. | 0 |
| Methyl bromide | [3]2-4 | 12 | [3].2-.4 | 9 | [5].1 | 10 | [3].005-.017 | 5 |
| Chloroform | [1]6.8-8.2 | 13 | 1.4 | 12 | .5-.6 | 13 | [3].2 | 8 |
| Carbon tetrachloride | 4.8-6.3 | 14 | 2.4-3.2 | 14 | .4-.6 | 12 | .16 | 11 |
| Ethyl bromide | [3]10-20 | 15 | [3]1-2 | 13 | [5].6 | 15 | [5].17-.3 | 12 |
| Methyl chloride | [4]15-30 | 16 | [3]2-4 | 15 | [5].7 | 16 | [5].05-.10 | 10 |
| Ethyl chloride | [3]15-30 | 17 | [4]5-10 | 16 | [5]4 | 17 | [5]2. | 14 |

[1] Bureau of Mines Technical Paper No. 248, 1921.
[2] International Critical Tables, vol. II, 1927.
[3] Henderson, Yandell, and Haggard, H. W., Noxious Gases, A. C. S. Monograph No. 35, 1927.
[4] Depending on value taken.
[5] Data from Figures 2, 3, 4, and 5, of this report.
Where no reference number is given results are from references 1, 2, and 3.

*Relative toxicity of refrigerants as indicated by United States Public Health Service.*

Table I

Pressures of Common Refrigerants at Different Temperatures

Temperature—Pressure Table

| Temperature F. | Anhydrous Ammonia | Sulphur Dioxide | Methyl Chloride | Ethyl Chloride | Carbon Dioxide | Ethane | Propane | Butane | Iso Butane |
|---|---|---|---|---|---|---|---|---|---|
| -40 | 8.7* | 23.54* | 15.7* | | | 99.8 | 1.5 | | |
| -35 | 5.4* | 22.41* | 14.4* | | | 109.8 | 3.4 | | |
| -30 | 1.6* | 21.10* | 11.6* | | | 120.3 | 5.6 | | |
| -25 | 1.3 | 19.63* | 9.2* | | | 132.0 | 8.0 | | |
| -20 | 3.6 | 17.93* | 6.1* | 25.3* | 205.8 | 144.8 | 10.7 | | 14.6* |
| -15 | 6.2 | 16.05* | 2.3* | 24.5* | 225.8 | 157 | 13.6 | | 13.0* |
| -10 | 9.0 | 13.9* | 0.3 | 23.6* | 247.0 | 172 | 16.7 | | 11.0* |
| -5 | 12.2 | 11.3* | 2.0 | 22.6* | 269.7 | 187 | 20.0 | | 8.8* |
| 0 | 15.7 | 8.8* | 4.1 | 21.5* | 293.9 | 204 | 23.5 | 15.0* | 6.3* |
| 5 | 19.6 | 5.8* | 6.3 | 20.3* | 319.7 | 221 | 27.4 | 13.2* | 3.3* |
| 10 | 23.8 | 2.59* | 8.6 | 18.9* | 347.1 | 239 | 31.4 | 11.1* | 0.2* |
| 15 | 28.4 | .51 | 11.2 | 17.4* | 376.3 | 257 | 35.9 | 8.8* | 1.6 |
| 20 | 33.5 | 2.48 | 14.1 | 15.8* | 407.3 | 277 | 40.8 | 6.3* | 3.5 |
| 25 | 39.0 | 4.64 | 17.2 | 14.0* | 440.1 | 292 | 46.2 | 3.6* | 5.5 |
| 30 | 45.0 | 7.00 | 20.5 | 12.2* | 474.9 | 320 | 51.6 | 0.6* | 7.6 |
| 35 | 51.6 | 9.58 | 24.0 | 10.1* | 511.7 | 343 | 57.3 | 1.3 | 9.9 |
| 40 | 58.6 | 12.4 | 27.9 | 7.0* | 550.7 | 368 | 63.3 | 3.0 | 12.2 |
| 45 | 66.3 | 15.5 | 32.2 | 5.4* | 591.8 | 390 | 69.9 | 4.9 | 14.8 |
| 50 | 74.5 | 18.8 | 36.7 | 2.3* | 635.3 | 413 | 77.1 | 6.9 | 17.8 |
| 55 | 83.4 | 22.4 | 41.7 | 0.15 | 681.2 | 438 | 84.6 | 9.1 | 20.8 |
| 60 | 92.9 | 26.2 | 46.9 | 1.6 | 729.5 | 466 | 92.4 | 11.6 | 24.0 |
| 65 | 103.1 | 30.4 | 53.6 | 3.3 | 780.4 | 496 | 100.7 | 14.2 | 27.5 |
| 70 | 114.1 | 34.9 | 57.6 | 5.2 | 834.0 | 528 | 109.3 | 16.9 | 31.1 |
| 75 | 125.8 | 39.8 | 64.4 | 7.3 | 890.4 | 569 | 118.5 | 19.8 | 35.0 |
| 80 | 138.3 | 45.0 | 70.6 | 9.5 | 949.6 | 610 | 128.1 | 22.9 | 39.2 |
| 85 | 151.7 | 50.9 | 79.4 | 11.9 | 1012. | 657 | 138.4 | 26.2 | 43.9 |
| 90 | 165.9 | 56.5 | 87.4 | 14.4 | | | 149.0 | 29.8 | 48.6 |
| 95 | 181.1 | 62.9 | 95.6 | 17.1 | | | 160. | 33.3 | 53.7 |
| 100 | 197.2 | 69.8 | 104.1 | 19.9 | | | 172. | 37.5 | 59.0 |
| 105 | 214.2 | 77.1 | 113.4 | 22.4 | | | 185. | 41.7 | 64.6 |
| 110 | 232.3 | 85.1 | 132.9 | 27.3 | | | 197. | 46.1 | 70.4 |

* Inches of mercury below one standard atmosphere. (29.92 in. = 14.696 lbs. abs)

occupational. Even at that, most of our major cities had some rather definite and drastic regulations covering the installation of large refrigerating plants in order to give the employees the necessary protection.

With the advent of household refrigeration the situation has been completely changed and a new hazard to the public has been introduced. This is an occupancy and not an occupational risk.

Up to a year ago the matter had been receiving concentrated attention of those societies interested in refrigeration as well as the legislative bodies of a number of states and cities, and during the past year however, the occurrence of a number of accidents in the City of Chicago has focused the attention of the public upon this point. For this reason it may not be out of place to present some of the more important data bearing on the toxicity of refrigerants.

The most reliable figures setting forth the relative toxicity of refrigerants are given on Page 31 of United States Public Health Bulletin 185, published by the United States Public Health Service in 1929. A reproduction of this table is published herewith.

Other data on relative toxicity by weight of various refrigerants is taken from the great German industrial authority, i.e. Lunge's "Chemische Technische

tion is so small that they may be considered of no consequence from the point of view of the manufacture or consumption of refrigerants.

The more common properties of the ordinary refrigerants are given in the American Society of Refrigerating Engineers' Circular No. 2, compiled by H. D. Edwards in 1896, and more physical data is published in the Circular No. 9 by the same Society, entitled "Tables of Thermodynamic Properties of Steam, Refrigerants and Brines."

Table 1 of this paper gives the temperature pressure relations of the more common refrigerants and Table 2 gives the more important physical properties. Figures 1, 2 and 3 show the temperature relations in the form of curves. The figures presented in this paper are taken from the above mentioned sources.

Of all chemicals suitable for use as refrigerants only air and water are completely free from all toxic hazard. The history of refrigeration from its beginning lists many accidents and fatalities with practically all refrigerants in general use. Previous to the advent of the household refrigeration machine these accidents occurred principally in commercial establishments using refrigeration for the purpose of cold storage or the manufacture of ice and the danger was confined entirely to the workingmen in such industries. The risk was almost entirely

Table II

More Important Physical Properties of Common Refrigerants

| Name | Ammonia | Sulphur Dioxide | Methyl Chloride | Ethyl Chloride | Carbon Dioxide | Ethane | Propane | Butane | Iso Butane |
|---|---|---|---|---|---|---|---|---|---|
| Chemical Formula | $NH_3$ | $SO_2$ | $CH_3Cl$ | $C_2H_5Cl$ | $CO_2$ | $C_2H_6$ | $C_3H_8$ | $C_4H_{10}$ | $C_4H_{10}$ |
| Molecular Weight | 17.03 | 64.06 | 50.49 | 64.51 | 44.01 | 30.06 | 44.08 | 58.10 | 58.10 |
| Boiling Point at 1 Atmosphere | -28.03 | 14.0 | -10.65 | 53.9 | -109.4 | -126.9 | -48.1 | 33.1 | 8.1 |
| Melting Point (Solid) | -107.8 | -103.4 | -132.7 | -217.7 | -109.3 | -277.6 | -309.8 | -211.0 | — |
| Critical Temperature | 271.2 | 314.8 | 289.6 | 360.0 | 88.4 | 89.8 | 204.1 | 303.4 | 272 |
| Critical Pressure (Abs) | 1651. | 1141. | 970.0 | 784. | 1071. | 718. | 661. | 551.3 | 537. |
| Density of Liquid at 32° Water = 1 | 0.638 | 1.44 | 0.952 | 0.920 | 1.56 | 0.446 | 0.536 | 0.601 | — |
| Density Gas lb/ft³ 32° 1 Atmos | 0.0517 | 0.1827 | 0.1438 | 0.2276 | 0.1234 | 0.0846 | 0.1260 | 0.1619 | — |
| Density Gas at 32° 1 Atmos Air = 1 | 0.596 | 2.264 | 1.782 | 2.31 | 1.528 | 1.049 | 1.562 | 2.067 | — |
| Specific Heat Constant Pressure | 0.520 | 0.511 | 0.24 | 0.273 | 0.2025 | 0.397 | 0.365 | 0.351 | — |
| Specific Heat Constant Volume | 0.401 | — | 0.20 | — | 0.1558 | 0.324 | 0.361 | — | — |
| Ratio Cp/Cv | 1.297 | 1.256 (16-34°) | 1.199 (68°) | 1.126 (63°) | 1.3003 (32°) | 1.224 (50°) | 1.153 | — | — |
| Comparative Volume Displacement per unit of Refrigeration | 5.77 | 15.1 | 11.6 | 37.0 | 1.0 | 1.7 | 5.8 | 12.7 | |

| Standard Ton Data | Ammonia 5° | Ammonia 86° | Sulphur Dioxide 5° | Sulphur Dioxide 86° | Methyl Chloride 5° | Methyl Chloride 86° | Ethyl Chloride 5° | Ethyl Chloride 86° | Carbon Dioxide 5° | Carbon Dioxide 86° | Ethane 5° | Ethane 86° | Propane 5° | Propane 86° | Butane 5° | Butane 86° | Iso Butane 5° | Iso Butane 86° |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Gage Pressure | 19.6 | 154 | 5.9* | 51.8 | 6.2 | 80.8 | 20.1* | 12.40 | 319 | 1024 | 221 | 666 | 30.4 | 143 | 13.2* | 26.9 | 3.3* | 44.8 |
| Volume Liquid ft³/lb | 0.0248 | 0.0269 | 0.0108 | 0.0118 | 0.0163 | 0.0179 | 0.0169 | 0.0182 | 0.0163 | 0.0267 | 0.0365 | 0.0569 | 0.0291 | 0.0329 | 0.0260 | 0.0283 | [illegible] | [illegible] |
| Volume Vapor ft³/lb | 8.15 | 1.77 | 6.42 | 1.18 | 4.53 | 1.07 | 17.06 | 3.29 | 0.2679 | 0.0474 | 0.639 | 0.122 | 4.27 | 1.47 | 9.98 | 2.24 | 6.41 | 1.52 |
| Density Liquid lb/ft³ | 41.1 | 37.2 | 92.0 | 84.4 | 61.0 | 55.8 | 57.0 | 54.88 | 61.22 | 37.41 | 27.4 | 17.8 | 34.3 | 30.4 | 38.4 | 35.4 | 37.4 | 34.0 |
| Density Vapor lb/ft³ | 0.122 | 0.564 | 0.156 | 0.844 | 0.220 | 0.844 | 0.058 | 0.304 | 3.74 | 21.09 | 0.690 | 0.122 | 4.27 | 1.47 | 0.1000 | 0.446 | 0.156 | 0.658 |
| Heat Liquid BTU/lb | 48.4 | 138.9 | 14.11 | 42.12 | 21.0 | 59.3 | -11.6 | 28.1 | -18.16 | 45.[illegible] | — | — | 3.0 | 51.0 | 2.5 | 48.5 | 2.5 | 50.0 |
| Heat Latent BTU/lb | 565.6 | 492.6 | 169.4 | 142.8 | 178.0 | 162.9 | 177.0 | 162.6 | 115.3 | 27.0 | 176 | 79 | 169.3 | 144.0 | 169.5 | 153.5 | 157.5 | 134.0 |
| Heat Vapor BTU/lb | 613.5 | 631.5 | 185.5 | 184.9 | 199.7 | 222.3 | 165.4 | 185.7 | 102.1 | 72.16 | — | — | 172.3 | 195.0 | 172.0 | 202.0 | 162.6 | 189.[illegible] |

* Inches of mercury below one standard atmosphere (29.92 in. = 14.696 lbs. abs)

Untersuchens Methoden." This is also presented with appended figures for methyl chloride.

The relative concentrations by weight of vapor of the various refrigerants in a room of given size which produce approximately the same toxic effect are given on Page 9 of American Society of Refrigerating Engineers', Circular No. 2. They are carbon dioxide 100; ethyl chloride 80; methyl chloride 70; ammonia 2; sulfur dioxide 1.

In considering the hazard attendant upon the use of any compressed gas whether used as a refrigerant or for other purposes, we must take the most careful cognizance of the fact that this hazard increases very rapidly with the amount by weight and the degree to which it is distributed throughout a building.

Properly safe-guarded by a strict regard for proper installation and design of refrigerating equipment and by the necessary municipal regulations, the hazard involved by the use of any of the ordinary refrigerants would be remote.

The recent unfortunate accidents in Chicago, in which a number of fatalities occurred cannot be blamed on the refrigerant, but on the use of multiple systems containing very large amounts of refrigerant; a practice which has been condemned by the almost unanimous opinion of experienced engineers.

New York adopted its latest ordinance on December 15, 1927 and is the only city at the present time having a code regulating household refrigeration. It virtually prohibits the use of systems containing over twenty pounds of refrigerant. Had a similar code been enforced in Chicago, no such accidents would have been possible.

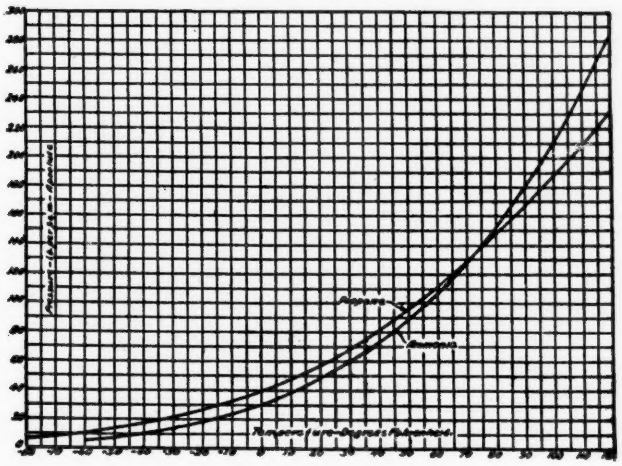


*Figure 1*

Besides New York, a number of our major cities and states have under consideration safety codes pertaining to refrigeration. Up to the present date none of these have been officially enacted. The American Society of Refrigerating Engineers has drawn up a safety code covering all phases of refrigeration and in all probability this code will be passed by the society in the near future. It is to be hoped that this will serve as a model for safety regulations pertaining to refrigeration which will be enacted by the various municipalities in this country. Too great stress cannot be placed on the importance of having a uniform and reasonable code over the whole country; one that is fair to all commercial interests that are concerned, and at the same time gives complete protection to the public.

## Fire and Explosive Hazards

A detailed discussion of the possible hazard from fire or explosion in the use of the commercial refrigerants would be beyond the scope of this paper. Of the common refrigerants, carbon dioxide and sulfur dioxide are not combustible and no explosion can be produced from these when intermixed with air under any conditions. The hydrocarbon refrigerants, ethane, propane, butane, and ethyl chloride are all combustible and considerable hazard is attendant upon their use. Methyl chloride and ammonia occupy an intermediate position. They can only be burned with difficulty and their explosive limits when mixed with air are extremely narrow. The risk of a serious accident occurring by reason of fire or explosion is remote.

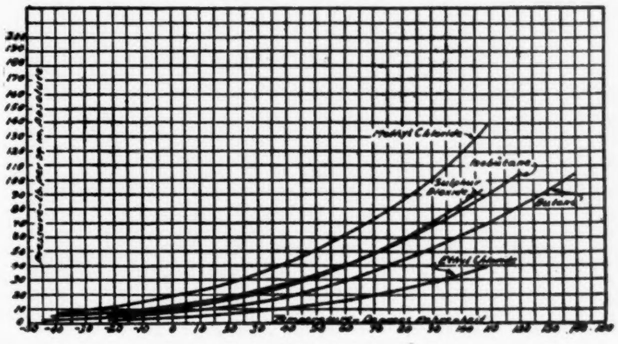


*Figure 2*

For a detailed discussion of this matter reference is made to the American Society of Refrigerating Engineers' Circular No. 2; to report No. 1130 of the Underwriters Laboratories entitled "Report on the Fire Hazard of Ethane, Propane, Butane and Ammonia as Refrigerants;" and report No. 1418 entitled "The Fire Hazard of Methyl Chloride as a Refrigerant."

## Transportation of Refrigerants

The transportation of refrigerants conforms in general to the regulation of the Interstate Commerce Commission, covering the transportation of compressed gases. This was completely covered in a paper by Belding entitled, "Transportation of Gases," Chemical Markets, February 1928.

A considerable quantity of refrigerants is marketed in cylinders ranging in capacity from 30-130 pounds. Many of the large consumers purchase their refrigerants in 1,200 pound tanks which are shipped in multi-unit tank cars. Larger quantities of refrigerants are shipped in tank cars having a capacity of from 12,000-60,000 pounds. In this connection it may not be out of place to state that a number of firms are

marketing refrigerants in small containers for the retail trade. One concern in New Jersey makes a specialty of supplying compressed gases in cylinders containing from a few ounces to as high as 100 pounds; carrying in stock some 25-30 compressed gases among which may be found all of the ordinary refrigerants.

### Carbon Dioxide

Carbon dioxide on account of its relatively low toxicity and absolute freedom from odor, has long been a favorite for marine refrigeration and for special purposes where an odorless and non-inflammable refrigerant is desired. It is extremely stable but is not adapted for refrigeration where the temperature of the available cooling water is high. Its critical point being the lowest of any of the substances employed as refrigerants, namely about 88° F.

Carbon dioxide is manufactured by a number of different methods. First, coke relatively free from sulfur is burned, care being taken to maintain an excess of air. The carbon dioxide mixed with nitrogen is cooled and thoroughly washed with water and the carbon dioxide passed into absorption towers where it is absorbed by a solution of potassium carbonate; the nitrogen passing on and the neutral carbonate being transformed into acid carbonate of potassium. On heating this solution the carbon dioxide is set free and is dried, subsequently compressed into a liquid and run into specially designed cylinders in which it is transported to the customer.

Considerable liquid CO2 is manufactured from the carbon dioxide produced as a by-product in the fermentation industries. Very recently considerable amounts are being produced from by-products of certain chemical industries and also from natural sources, as gas wells, some of which produce large volumes of carbon dioxide in an almost pure form. The amount of liquid carbon dioxide used for refrigeration purposes is difficult to determine. Most of the commercial product being utilized for carbonating soda water and soft drinks. The best estimate that the writer can give is from 500,000 to 1,000,000 pounds per year.

### Ammonia

For over half a century ammonia has been the most important chemical used for refrigerating purposes both with the compression machines, where anhydrous liquid ammonia has been used and in the absorption machines where strong aqua ammonia has been used as the refrigerant.

The chemical and physical properties of ammonia are too well known to need any further description than is given in the tables of physical data presented with this paper. The summary of tariff information, 1929, page 67, gives the following production figures of anhydrous liquid ammonia. 1914, 16,659,789 pounds; 1919, 25,684,050 pounds; 1921, 21,127,421 pounds; 1923, 23,529,382 pounds; 1925, 31,724,858 pounds; 1927, 45,233,020 pounds.

Up to the year 1925 this was chiefly produced from aqua ammonia. In 1928 the same authority states that 29,000 tons of synthetic ammonia were produced in this country. There are in this country to-day, seven concerns whose aggregate capacity amounts to approximately 300 tons of synthetic ammonia per day, or a total production capacity of 80,000 to 90,000 tons per year. This agrees closely with the estimate by Tyler given in a paper entitled "Retrospect and Prospect in the Nitrogen Industries," Chemical Markets, June 1929.

It might be interesting to note that the production of synthetic ammonia by the I. G. Farbenindustrie Aktiengesellschaft, using Haber-Bosch Ammonia Fixation process, amounts to the enormous total of 660,000 tons of fixed nitrogen annually, which is equivalent to approximately 800,000 tons of ammonia.

From 1923 to 1928 the amount of anhydrous ammonia sold to the refrigeration industry has varied between 24 to 27 million pounds. It is probable that the consumption during 1929 will be approximately 29 to 30 million pounds of liquid anhydrous ammonia.

The amount of aqua ammonia used in the refrigerating industry for absorption systems is rather difficult to estimate and no reliable figures seem to be available since 1914, when approximately 2,000,000 pounds were consumed as a refrigerant. As the amount of refrigeration accomplished by the absorption process has not increased in proportion to the

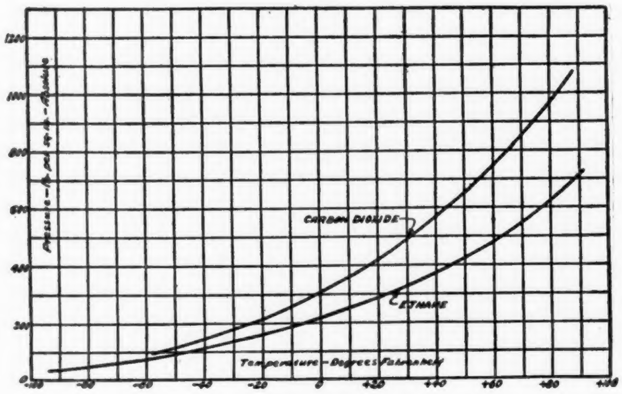



*Figure 3*

amount produced by the compression machines it is most likely that there is no great increase over the 1914 figure.

### Sulfur Dioxide

The use of sulfur dioxide has been mostly confined to the household field. We may take the year 1910 as the date for the beginning of the domestic refrigeration industry as a commercial business. From then until 1922 to 1923 sulfur dioxide was the only refrigerant suitable and available to the manufacturer of the small household machine. In the writer's opinion this fact more than any other accounts for its extensive use in the household machines.

It is a colorless liquid or gas and is relatively the most toxic of our common refrigerants. It has no

corrosive effect on metals if entirely dry but traces of moisture result in the formation of sulfurous acid which will act on metals, especially iron. This has caused considerable trouble in the past for until anhydrous sulfur dioxide became available on the market the commercial article contained enough moisture to render it troublesome when used as a refrigerant. The advocates of the use of sulfur dioxide consider that its obnoxious odor is a considerable advantage in that it constitutes a warning in case of accident.

In 1914, the Ansul Chemical Company of Marinette, Wisconsin, and in 1916 the Virginia Smelting Company of Boston began supplying a special grade of anhydrous sulfur dioxide to the refrigerating trade. At the present time sulfur dioxide can be obtained containing less than .01 per cent of moisture.

There are no reliable figures available for the amount of sulfur dioxide used by the refrigeration industry. In all probability the amount so used in 1910 was less than 5,000 pounds, increasing gradually until in about 1922 a market for approximately 100,000 pounds was created. It might be estimated that 4,000,000 to 5,000,000 pounds were used annually by the refrigerating industry during the years 1928 and 1929 and that an increased consumption could be predicted for the next few years.

## Methyl Chloride

Previous to 1920, the date of its introduction as a refrigerant in the United States by the Roessler & Hasslacher Chemical Company, methyl chloride was not available as a refrigerant in the United States. Although in Europe its use as a refrigerant had become general and it was recognized that it was especially adapted for fractional ton refrigeration and had established a reputation for being one of the safest and most practical refrigerant to use for this purpose. Both in France and Germany it had replaced to a large extent sulfur dioxide as a refrigerant for use in the small machines.

| Substance | Concentrations: Killing Quickly, Vol. % | Killing Quickly, Lbs. per 1,000 cu. ft. | Very serious effects produced by breathing ½ to 1 hour, Vol. % | Very serious effects produced by breathing ½ to 1 hour, Lbs. per 1,000 cu. ft. | No serious effects even after ½ to 1 hour, Vol. % | No serious effects even after ½ to 1 hour, Lbs. per 1,000 cu. ft. |
|---|---|---|---|---|---|---|
| Carbon Dioxide | 30% | 33 | 6–8% | 7–9 | 4–6% | 4. -6.8 |
| Methyl Chloride (Tests of R. & H. Chemical Company) | 15–30% (est.) | 20–40 (est.) | *5–10% | 6–13 | 2–3% | 2.6–4.0 |
| Ammonia | 2% (est.) | 0.9 (est.) | 0.35% | .0.15 | 0.03% | 0.013 |
| Sulphur Dioxide | 0.2% (est.) | 0.3 (est) | 0.04% | 0.08 | 0.005% | 0.008 |
| Chlorine | 0.1% | 0.2 | 0.005% | 0.1 | 0.0004% | 0.007 |
| Chloroform | 7% | 22 | †1.4–3% | 4.3–9.3 | 0.5 % | 1.6 |

*Relative toxicity by weight of various refrigerants according to "Chemische Technische Untersuchens Methoden".*

Since the date of its introduction in this country methyl chloride has had a slow but gradually increasing use as a refrigerant with small capacity machines and while its use has been principally confined to the household refrigeration field it is finding considerable favor as a refrigerant for plants having several tons capacity.

Methyl chloride is as odorless, as non-corrosive, and nearly as non-toxic as carbon dioxide. Its physical properties are such as to render it especially adaptable to machines ranging in capacity from 100 pounds of refrigeration per 24 hours to 5 tons. It is extremely stable and does not become corrosive when mixed with traces of moisture. It may be obtained as a commercial refrigerant having a purity of 99.5 per cent or better.

There is no reliable data available on the amount of methyl chloride sold at the present time. The best estimate that could be given would be that the present market is in the neighborhood of 1,000,000 pounds yearly and that its consumption will increase steadily.

## Ethyl Chloride

As a refrigerant ethyl chloride has two very distinct disadvantages. First it is highly inflammable and a number of fatalities have resulted in its use as a refrigerant in domestic machines. Second, machines using ethyl chloride have the disadvantage of having to have their low side operate under less than atmospheric pressure.

A few years ago some six or eight companies manufacturing smaller type of refrigerating equipment were using ethyl chloride as their refrigerant. So far as the writer is aware only one company is at the present time using this substance for refrigerating purposes. Attempts have been made to reduce the fire hazard by the admixture of certain quantities of methyl bromide with ethyl chloride; such a mixture being marketed under the trade name of "Methide." The unfortunate outcome of this attempt, resulting as it did in an accident to a multiple system, in Danbury, Connecticut, in which two fatalities and one serious illness occurred, brought an end to all attempts to utilize this type of refrigerant.

## Hydrocarbon Refrigerants

Before the use of anhydrous ammonia became general in the refrigeration industry we find that much of the commercial refrigeration was produced by the use of very volatile fractions of crude petroleum. These were marketed under different trade names but mostly were sold under the caption of "Cymogene" or "Rhigolene." Owing to the fire hazard attendant in their use they were given up rapidly as refrigerants as soon as anhydrous ammonia became commercially available.

A recent work of the Carbon & Carbide Chemical Company has made a number of the hydrocarbons available as refrigerants and these are produced by this company in a very pure form by the condensation and subsequent fractional distillation of natural gas. As far as the writer is aware, only one of these, namely, iso butane is used for general refrigeration purposes and its use is confined to one or two manufacturers of small household machines.

We find however, that ethane and propane are both admirably suited for the purpose of low temperature

refrigeration in industrial plants where proper measures can be taken as safe-guards from fire or explosive risks. Many thousands of tons of refrigeration are produced in which ethane and propane play the part of the refrigerant.

There is no very definite data available on the amount of ethane and propane marketed for this purpose and the amount of iso butane used in household refrigeration is probably small.

### High Boiling Refrigerant

The high boiling refrigerants include, carbon, tetrachloride, dichlor methane, dichlor ethylene and trichlor ethylene.

All of these are liquids at ordinary temperature and pressure, and have boiling points under normal conditions considerably over 100° F. Their use is almost exclusively confined to air conditioning refrigeration, where large rotary machines operating under vacuum on both high and low sides are economical.

In this country, so far as the writer is aware, there is only one firm manufacturing refrigerating machinery employing this class of refrigerants. No knowledge is available of the amount used.

### Conclusion

While it would be difficult to predict with any degree of certainty what the consumption of refrigerants will be during the coming years, it can be stated with certainty that the sale of ammonia will gradually increase and will in general follow the increase in refrigeration capacity. This would mean that we might expect the market for anhydrous ammonia used as a refrigerant to increase from the present sales, amounting from 27 to 30 million pounds per annum, to a possible market of 45 to 50 million pounds by 1940.

The writer hesitates to express any opinion as regards the future of refrigerants in the domestic field, but it is his own opinion and one which is concurred in by a number of the older and more experienced refrigerating engineers, that the market for sulfur dioxide as a refrigerant will show an increase during the next two or three years and then gradually decline; and that eventually methyl chloride will be adopted as the almost universal refrigerant in this field and will occupy the same place here as ammonia in the commercial field.

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**Russia possesses only one mercury mine, that at Nikitowka. Plans are now under consideration, however, for the erection of a large new refining plant costing about two million rubles. The existing plant, it is reported, is capable of producing about 160,000 kilogrammes per year and this is stated to meet nearly the whole of Russian home needs. With the new plant it is anticipated that the cost of production per kilog of mercury will be reduced from 5.23 kopeks to 3.30 kopeks and that there will be a considerable export trade.**

**The industrial program of the Soviet Union for the next five years provides a budget of 31,000,000 rubles to be used for the exploitation of the potash mines in the Ural, says the Department of Commerce.**

## *The Industry's Bookshelf*

**Commercial and Industrial Organizations of the United States,** by U. S. Bureau of Foreign and Domestic Commerce, 272 pages, Government Printing Office, Washington, D. C.

A tabulation of more than 13,000 trade, industrial and professional associations and organizations.

**Forty Years with General Electric,** by John T. Broderick, 218 pages, Fort Orange Press, Albany, N. Y., $2.50 net.

A description of the company by a man who has worked for it for forty years.

**Money,** by Samuel Crowther, 204 pages, Stratford Co., Boston, Mass. $2.00 net.

Mr. Crowther's advice on how to make, invest and use money.

**Tin,** by Dr. C. L. Mantell, 366 pages, Chemical Catolog Co., New York $7.00 net.

An American Chemical Society Monograph giving a comprehensive treatment of tin in all its ramifications.

**Industrial Arts in Education,** by Dean M. Schweickhard, 367 pages, The Manual Arts Press, Peoria, Ill., $3.00 net.

A specific attempt to show the place of industrial arts in modern education.

**Cement,** by Henry W. Nichols, 15 pages, Field Museum of Natural History, Chicago, $.25 net.

The history, manufacture of and uses of cement described in Geology Leaflet 12.

**Transportation Glossary,** by H. G. Brady, 105 pages, Simmons-Boardman, Publishing Co., New York.

Definitions for students of transportation of the terms and phrases in common usage in air, highway, railroad and ocean transportation and in port traffic.

**The Labor Banking Movement in the United States,** prepared by the Industrial Relations Section, Princeton University, 376 pages, $2.50 net.

An intensive and comprehensive study of the purposes, policies, and experience of the labor banking movement.

**The Wonderful Story of Science,** by Mrs. Inez Nellie McFee, Thomas Y. Cromwell Co., New York, 398 pages, $2.50 net.

A story of the world's scientific progress written in a simple popular style.

**Public Regulation of Competitive Practices,** prepared by the National Industrial Conference Board, New York, 320 pages, $3.00 net.

A revised edition of this phase of governmental regulation of business enterprise, discussing the developments in trade practice conferences and significant court decisions.

**Cost Accounting and Office Equipment** by Willard J. Graham, 120 pages American Technical Society, Chicago, Ill., $2.00 net.

A treatise on process cost accounting, specific order cost accounting, how costs are collected and allocated, accounting and bookkeeping machines, correspondence, filing and mailing equipment.

**The A B C of Accounting,** by Stanley Edward Howard, 302 pages, Princeton University Press, $3.00 net.

Accounting for those with a non-professional interest in the subject.

**Practical Chemistry,** by Lyman C. Newall, 168 pages, D. C. Heath & Co., Boston, Mass., $1.72 net.

A textbook for students in first year chemistry.

# Anhydrous Aluminum Chloride

*Lower prices arising out of increased production and improved production methods, point the way to broadened markets and new uses for this well-known catalyst.*

By Kenneth H. Klipstein
*Treasurer, E. C. Klipstein & Co.*

Anhydrous aluminum chloride is used almost exclusively to promote certain types of organic chemical reactions. Being only a means to an end, secondary prominence has been accorded it during the recent years of the development of the chemical industry. Many reports covering salts of aluminum have either omitted it entirely or have made no attempt to differentiate between the anhydrous chloride and the commercial 30 per cent solution, although the two are distinctly different articles. While the products manufactured from it have grown constantly in importance, the consumer's interest has been in the products so produced and not in the process. Only recently, since catâlysis has been accepted as a fact and the word has come to signify a definite and important subdivision of the whole science of chemistry, has general interest been aroused in its properties, production, and uses.

## Properties

The pure anhydrous chloride is a snow white crystalline solid. The color of the commercial product depends upon the amount of iron chloride present as an impurity, and varies from yellow to brown. It has a pronounced tendency to absorb water. This property complicates handling of the product, insomuch as exposure to the atmosphere results in absorption of moisture,—a small amount of which will render entirely unfit for catalytic purposes a substantially greater quantity of chloride. In any process where it is involved, apparatus, raw materials, and solvents should all be as free from moisture as possible. It is sometimes even advisable to dry by special treatment materials commonly considered dry, as benzene, since these generally contain traces of dissolved moisture, in order to prevent losses which would otherwise necessarily result.

When used in the production of anthraquinone, and in similar processes, it is either impractical or impossible to separate it from the finished product at the end of the process, except through treatment with water. The chloride thereby loses its catalytic property. This has been partly responsible for its limited application in industry. Furthermore, the catalyst has the characteristic of attaching itself to certain compounds as they are formed. After so combining it can no longer function. Most catalyst, in contrast, are neither destroyed at the end of the process nor are rendered inactive during the process. The platinum mass in a contact sulfuric acid plant, for example, or the newer vanadium catalyst, theoretically need never be renewed. Small amounts serve to activate immense quantities of the product, and the initial cost is, relatively at least, unimportant.

## Methods of Production

It is for these reasons that so much effort has been made to reduce the initial cost of anhydrous aluminum chloride and to develop a means of recovering it after use in some form which has a commercial value.

The commonly known commercial 30 per cent solution is made by dissolving aluminum oxide in muriatic acid. The very property which makes it useful for carbonizing wool makes impossible the recovery of the anhydrous chloride from the solution. In attempting to evaporate to complete dryness, decomposition sets in with re-formation of aluminum oxide and muriatic acid. It has, therefore, been necessary in developing practical methods of production to start exclusively with anhydrous materials.

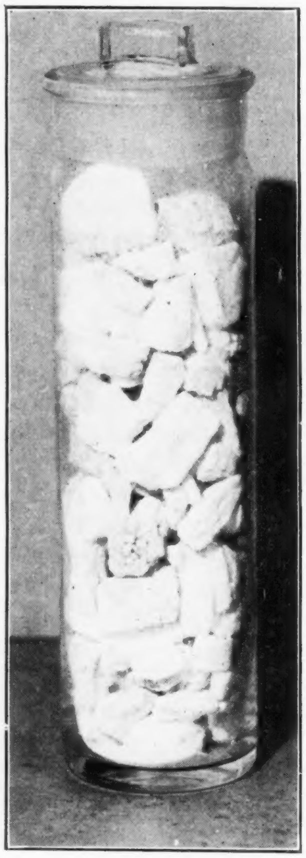
Various forms of aluminum have been proposed as the starting material, and include the oxide, the carbide, the silicate, and the nitride. Both chlorine gas and compounds containing chlorine, such as phosgene, carbon tetrachloride, sulfur chloride, and muriatic acid and its salts, have been suggested. The only processes which are operated in the United States to-day employ either aluminum oxide, or metallic aluminum, and chlorine gas. In the case of aluminum oxide, a third material, carbon, is added to remove oxygen during the chlorination; in the case of

the metal, combination with chlorine may be made directly.

One difficulty encountered is that the reaction is usually carried out at high temperatures. Chlorine, while easily controlled at low temperatures, at high temperatures is exceedingly corrosive. The apparatus must be capable of withstanding chlorine at 1000° C. Complications arise in that intimate contact of the starting materials, whether aluminum oxide, carbon, and chlorine, or metallic aluminum and chlorine, is essential for high yields. The chloride sublimes at 183° C. under atmospheric pressure and provision must be made for condensation of the vapors. Finally, the apparatus must have sufficient capacity so that labor and repair charges are kept within economical limits. Descriptions of the manner in which these problems have been solved are already available.

The Gulf Refining Company is to be credited with a remarkable achievement in the development of its process at Port Arthur, Texas. Bauxite ore, coal, and chlorine, the raw materials, are combined under the proper conditions. The difficulties were apparently unsurmountable before the process was brought to its present stage of perfection.

A radically different method of manufacture is the process originated by B. H. Jacobson and developed in connection with the production of intermediates at South Charleston, West Virginia. Scrap metallic aluminum, which, based on the aluminum content, has a market value lower than the virgin metal, is first treated with bromine. Bromine will not only combine vigorously with aluminum at ordinary temperatures, but also can be readily displaced from the resulting aluminum bromide by chlorine. The bromine so liberated reacts instantaneously with any free metallic aluminum, with the further formation of aluminum bromide, only to be displaced again by chlorine as it is passed over the material.



*Lump crystals of anhydrous aluminum chloride.*

## Analysis of Finished Product

The purity of the finished product made by this method is high. It contains a trace of aluminum bromide, but aluminum bromide acts chemically as the chloride. An average analysis indicates less than 0.05 per cent iron, or 0.15 per cent calculated as ferric chloride. Other metals than aluminum and iron are either entirely absent or present in negligible quantities. Handling after production inevitably results in the absorption of a certain amount of atmospheric moisture, but with reasonable care decomposition from this source may be held to a minimum. Analytical sublimation of the lump chloride, for example, indicates only 0.2 per cent non-volatile as a result of such exposure. The physical form of the product may be varied from large lumps to a fine powder, with graduated sizes between the two extremes, depending upon whatever special conditions have to be met.

## Containers For Shipment

A satisfactory package for most purposes is a steel drum, designed to be completely air tight when closed, and sufficiently strong to stand up under shipment and return a number of times. Such a container is suitable for carload lots, where the questions of weight and cost of container per pound of material shipped are of importance. Special containers other than the usual steel drums are sometimes used. Where the material is consumed in small quantities, small packages are advisable, not only to facilitate handling but also to insure fresh material, as each time a container is opened more or less deterioration results.

## Uses

Probably the largest individual use for anhydrous aluminum chloride in the United States is in the petroleum industry. Its catalytic function in this industry is unique in that one of its main effects is to decompose rather than synthesize. When high boiling petroleum products, free from water, are distilled over anhydrous chloride, they are broken down into low boiling products, or are "cracked" and the yield of gasoline per barrel of original crude oil is increased. In this respect it accomplishes the same results as the high temperature cracking processes, but at a low temperature. In addition it converts unstable unsaturated compounds into stable saturated compounds, simplifying the final treatment of the gasoline. It also tends to split sulfur compounds into hydrogen sulfide, which is easily removed in subsequent processing. The petroleum distillates from oils treated with it are saturated sweet-smelling products.

## Efficiency For Cracking Purposes

There seems to be no question as to the efficiency of the chloride for cracking purposes. Two to five per cent on the weight of the original oil is required to bring about the desired effects. The exact percentage depends upon the type of oil, the degree of unsaturation, and the sulfur content. In the cracking process anhydrous iron chloride may be substituted for aluminum chloride, although not as efficient as

the latter, and therefore it need not be considered as an impurity. Powdered chloride is preferable to the lump. The catalyst is rendered inactive chiefly by the accumulation of carbon and is finally removed from the still as a sludge or a coke.

### Use in Anthraquinone Manufacture

Another use of the chloride, but on a considerably smaller scale, is in the manufacture of dye intermediates of the anthraquinone series. Shortly after the World War, the synthetic process, due to various factors, rapidly displaced the chromic acid oxidation of anthracene in the United States. It comes under the general head of the Friedel and Crafts reaction, whereby organic acid anhydrides, acid chlorides, and aliphatic chlorides may be condensed in the presence of the catalyst with aromatic hydrocarbons. Conditions must be so controlled that decomposition is secondary, since the the same effect of cracking is exerted on aromatic hydrocarbons as on petroleum products.

Anthraquinone is produced synthetically in two steps: first, the catalytic condensation of phthalic anhydride with benzene; and second, dehydration of the intermediate ortho-benzoyl-benzoic acid with sulfuric acid to bring about ring closure. It has been found that the ratio of two molecules of chloride to every molecule of phthalic anhydride, or approximately two pounds to one, is necessary to obtain a high yield. The reason is believed to be that the catalyst combines with ortho-benzoyl-benzoic acid, in the manner described at the beginning of this article, and its function ceases. The complex compound is treated with water, and the insoluble ortho-benzoyl-benzoic acid separated from the aluminum chloride solution.

### Problem of Apparatus Corrosion

Beside the fact that so large a quantity of chloride must be used and cannot be recovered as such, that the reaction and subsequent handling in plant operation are very much more complicated than the simple laboratory procedure, and that it is difficult to maintain yields and to check the inevitable decomposition, there is the additional problem of corrosion of apparatus. This has to be contended with in every Friedel and Crafts reaction in industry. Large volumes of hydrochloric acid gas are evolved, and the separation of the excess solvent and finished product, in this case benzol and ortho-benzoyl-benzoic acid, from the solution of aluminum chloride, which is strongly acid, requires novel methods of handling.

Despite these conditions the process has been commercially successful in some instances and recent improvements as a result of large scale manufacture over a period of years have made possible a substantial reduction of costs.

No attempt will be made to list all the different uses of anhydrous aluminum chloride. Every laboratory student in organic chemistry has had to make as a regular part of his early training simple preparations by means of it and to familiarize himself with its properties. It is anticipated that, with the catalyst available in commercial quantities, there will be a gradual increase in its consumption in industrial processes based on long known laboratory syntheses, and a development of hitherto unknown uses.

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## French Chemical Industry Looks For Self-Sufficiency

Although a desire to attain self-sufficiency has prompted marked expansion in France's chemical industry, the French output is still one-fifth that of the United States and less than half that of Germany. This remarkable expansion of the French chemical industry during recent years is revealed in a study of French chemical production and trade issued by the Department of Commerce.

The desire to attain self-sufficiency in this branch of industry, according to the survey, has been largely responsible for the recent developments in French production of chemicals, and expansion has been chiefly in connection with coal-tar products and the fertilizers—fixed nitrogen and potash. As in the case of other European chemical-producing countries, expansion is envisaged primarily in terms of export. At present, over 25 per cent of the French production is marketed outside that country, principally on the continent and in French possessions and protectorates.

A decided raw material and marketing interdependence has sprung up among European chemical producers, which, together with a common aim as to export expansion, has brought about the preliminary mergers and cartels and the subsequent international accords of recent years. France and Germany have been prominent in such movements, but their success has been nullified to a large degree through inability to interest the United Kingdom, which, in view of its Empire markets, has more in common with the American than the continental industry.

Exports of French chemicals have an annual value of about $130,000,000, 60 per cent of which consists of perfumes and floral oils, medicinals, fertilizers and naval stores. The United States is a market for one-eighth of the shipments, chiefly potash, perfume and essential oils. Imports of chemicals into France have an annual value of approximately $100,000,000, but only 5 per cent of this amount comes from the United States and three-fourths of this small proportion consists of sulfur and carbon black. In other words, the United States purchases from France nearly three times as much chemical products as it sells in that country.

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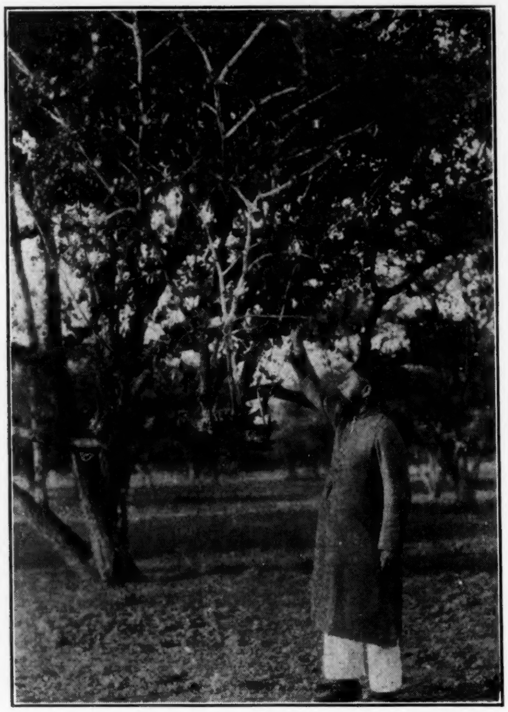
German Nitrogen Syndicate (Berlin) and the Ammonia Union (Bochum) grant from July 1, 1929 to June 30, 1930, the following resale discounts to dealers in their artificial nitrogen fertilizers. The discounts apply to gross value of sales, exclusive of extras:

| | |
|---|---|
| Up to 50,000 marks | 2.75 per cent |
| Over 50,000 marks | 3.25 per cent |
| Over 200,000 marks | 3.75 per cent |
| Over 500,000 marks | 4.00 per cent |

Higher discounts may be granted after actual deliveries exceed a value of half a million marks. Furthermore, 1 per cent of the gross amount of syndicate bills is granted for advertising purposes. A final speical discount of one-fourth of one per cent is granted the two largest purchasers of nitrogen fertilizers. Consumers may not be granted a discount in any form, says the Department of Commerce.

# Industrial Uses of Shellac

By William H. Zinsser
*President, William Zinsser & Co.*



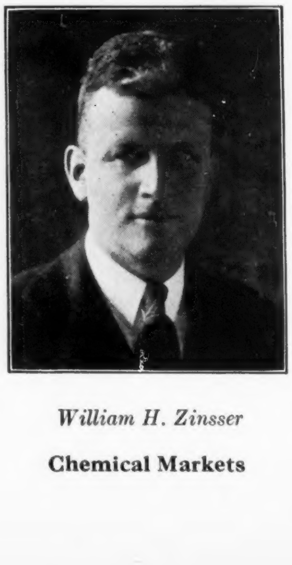
*A native breaking a branch from a lac tree. Millions of these branches are gathered yearly and ground into bits in the crude factories of India and Siam.*

At some time during the early dawn of history the natives of India produced a dye by extracting with ash solutions the waxy-resinous colored material secreted by a louse-like insect to-day known as Tachardia Lacca, or shellac insect. A lime alumina lake of this dye was produced and sold under the trade name of lac-dye or lac-lac. This industry disappeared before the triumphant progress of the scientifically fostered coal tar industry. To-day, of several dyes similar to lac-dye, only carminic acid remains a product of commerce, this being for use in rouge and similar products; however, with our many synthetic dyes of stable properties, we cannot even regard lac-dye any longer as a true dye.

### From Lac-Dye to Shellac

But many centuries after the discovery of lac-dye and yet centuries before the present day, a new use was discovered for the material in which the little insects enshroud themselves. The resinous material was found to have properties of a varnish and became a product of commerce known as shellac.

Shellac is one of the important products used in the industries of the world to-day, although the information available on its origin and uses is noticeably lacking. It is an organic resin produced through chemical processes taking place in the life of an insect and because of resiliency and soluble qualities stands out in world commerce in contrast to the vegetable resin. It has qualities possessed by no other gum and is soluble in alcohol or in an alkali water solution, but not soluble in turpentine.



*William H. Zinsser*

### Varied Uses of Shellac

As long ago as 1590 there is a record of shellac having been dissolved and used as a coating or crude varnish, and from that date, uses, to which it is now so universally put, have been developed until to-day it is the "open sesame" to all phases of the painting and decorating art; the friend of the sculptor, electrician and metal worker, and the companion of the woodworker and furniture finisher. It is the facile aide of the foundry pattern makers, the base of buttons, phonograph and talking machine records, telephone parts such as receivers and mouthpieces, imitation ivory products, billiard balls and poker chips. It is shellac that holds the filament of the electric light bulb in place, and it is the size or stiffening used by the hat maker, and which makes possible the many shapes and styles that fashion demands. Shellac is one of the chief ingredients in sealing wax, light drying inks, shoe dressing, and wood cements; it is the "snap" in playing cards and the artful finisher for leather, imitation leather, wall paper, hardwood floors, pencils, broom and brush handles, autos, pianos, and what not. Shellac is the modern finish of the up-to-date rubber rain coat; it is the sealer used to make "leak-proof" the myriads of gasoline tanks that line the

highways; and is even used as a cement for sealing the seams in the manufacture of cans for foodstuffs and liquids. It is used in the manufacture of brushes as a cement to firmly hold the bristles in place. It is an important ingredient in lacquers giving them body, adhesion and flexibility.

Chemists have spent years looking for a substitute for shellac for use in industry and yet, to-day, they have only arrived at make-shifts that do not pretend to have the many important qualities of shellac.

## Shellac in Woodworking

Shellac and the woodworking industry are probably most commonly associated in the minds of the average individual—shellac was the starting point for the woodworker in his small "abc" days in the finishing room; and as his experience grew this quick-drying varnish came to be not only his utilitarian "life-saver" when nothing else could suggest itself, but as he became more skilled he found shellac to be his most valuable asset for his fine and costly finishes.

*Lac is carried to its place of export on camel back, and shipped in gunny sacks weighing 164 pounds each when filled.*

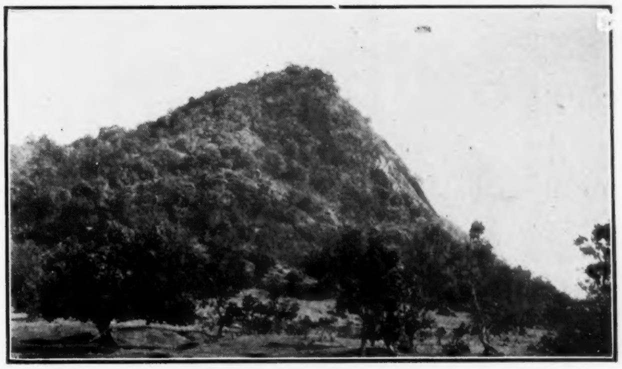
To-day, after years of development and progress in the furniture and woodworking industries, and despite the attacks of so-called substitutes, undercoaters and sealers, it is realized that pure shellac is the only varnish that lends itself successfully to so many stages of the finishing operation from sealer and priming coat to either a dull antique or high French polish finish.

## Thirty Million Pounds Imported

While it is true that a very large percentage of the shellac imported to the United States from India (the total of which is, roughly, 30,000,000 pounds annually in the raw or orange gum state) is used in the woodworking field, many of the other industries which we mentioned earlier are surprisingly large users; and new industries are discovering that shellac, as old as the ages, is just beginning to find its place in the solution of their industrial problems.

For instance, while shellac has been used for years in the compounding of rubber and in the finishing of moulded rubber goods and druggists' sundries, who among us would have imagined shellac as a finish for rubberized fabric sheeting or leatherette for automobile tops, upholstery, etc., but the fact is that shellac actually adds to the water resistance of rubber.

The latest development of shellac for use over rubber is in finishing various colored rubberized



*A forest of lac trees in India, where myriads of tiny red insects swarm over the branches, feed, propagate and die. The exudations of their bodies produce the substance from which shellac is made.*

fabrics, (blue, red, green and yellow), from which are manufactured the gay-colored raincoats "milady" dons.

## Hatters Use Large Quantities

Years ago, when women left off wearing the old-fashioned poke-bonnet, shellac had considerable to do with the increasing popularity of fantastic shapes for women's headgear, since shellac was found to be the ideal hat stiffening and binder. The smart sailor hat which was so popular when the bicycle craze was at its height—and, in recent years when felts of many shapes and hues began to be worn by women,

*The lac is cleared of coloring matter by placing it in a coarsely woven cloth, dipping it into clear water and twisting the cloth container.*

all took their share of shellac. Likewise, since men have been educated to have at least two respectable looking hats besides their straw, shellac importers and bleachers have had to provide an increasing quantity to the hatters.

And so there is hardly an industry to-day that does not use shellac to a greater or less degree at some stage in its manufacturing processes. Not all, of course, in the same large quantities as the furniture, electrical and hat industries, but in continually

*Native women inspecting and assorting the lac which is divided into three classes. The best grade is used for shellac manufacture, the less pure for fuel, and a third part, known as Khud, for the manufacture of trinkets.*

increasing amounts, as is evidenced by the steady growth in shellac importations from India.

It is realized that there are undoubtedly new fields of usefulness which have not yet been discovered; but the very fact that shellac has so many qualities and properties which make it superior to any of its substitutes in spite of the extensive and exhaustive researches to find something to take its place, is largely responsible for the rapidly increasing consumption of shellac in American industry.

## German Ammonia Cartel Sells 400,000 Tons By-Product Sulfate

German Ammonia Sales Cartel of Bochum announces it sold 400,000 metric tons of by-product ammonium sulfate in 1928, equivalent to approximately 80,000 tons primary nitrogen. This cartel is a member of the German Nitrogen Syndicate of Berlin, dominated by the German dye trust now producing about 700,000 tons of primary nitrogen annually. The nitrogen cartel's membership also includes the calcium cyanamide producers.

Product by the by-product ammonia producers (Rhur coke and gas plans chiefly) increased 13 per cent in 1928 over the preceding year. The increase was chiefly from the new synthetic plants (Rhurchemie Aktiengesellschaft and Gasverarbeitung Aktiengesellschaft), which contribute 43,000 tons ammonium sulfate to the total 1928 figure.

Despite this increased output, stocks on hand at the end of 1928 were but two-thirds their level at the beginning of the year. Export sales by the by-product ammonium sulfate cartel were 40 per cent higher than 1927.

Potash deposits in Tripoli are being exploited by Italian interests. Two very large salines are being opened up in the Zuaro territory near the Tunisian frontier and not far from the coast, and plants for the isolation of the potash salts are being erected in Pisida. It is reported that when these plants commence operations the initial annual output will be 12,000 tons of potassium sulfate, 10,000 tons of magnesium sulfate 20,000 tons of magnesium chloride, and 20,000 tons of potassium chloride, the residue from these quantities being 800,000 tons of sea salt. In conformity with the usual Italian practice of protecting the country's home industries to the utmost, there is little doubt that these materials will find their first outlets on the Italian market.

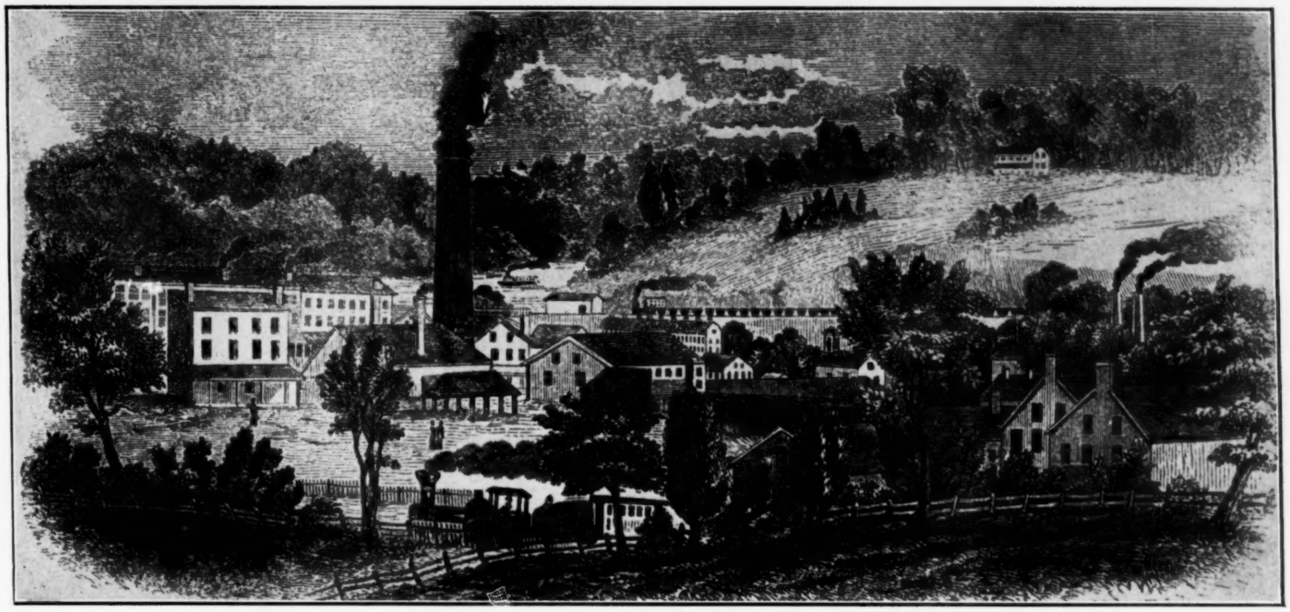
## *Who's Who In Chemical Industry*

**Knight, Charles Herbert,** president, Papermakers Chemical Co., and other interests. Born, Newton-Le-Willows, Lancaster, Eng.; mar., Ethel C. Gibbons, Srpingfield, Mass., 14 Jan. 1903; children, 3 sons, 4 daus.; educat., pvt. Eng. grammar sch., Amer. bus. coll. Dry goods, 9 yrs.; chemicals, 28 yrs.; Western Chem. Co., pres.; Vern Chem. Corp., pres.; Superior Sizing Co., Inc., pres.; Papermakers Importing Co., pres.; Adirondack Mineral Co., Inc., secy.· Empire Size and Chem. Corp., secy.; Ga.-La. Corp., secy.; Keystone Prods. Co., secy., John Regnier & Son Co., treas.; Superior Pine Prods. Co., vice-pres.; Vern Chem. Co., vice pres., Papermakers Chem. Co., pres. Memb., Mason 32°. Hobby: boys' work. Address: Papermakers Chem. Co., 640 No. 13th St., Easton, Pa.

**Landis, Walter S.,** vice-president, American Cyanamid Company. Born, Pottsdown, Pa., 5 July 1881; mar., Antoinette M. Prince, Bethlehem, Pa., 9 June 1909; children, 2 sons; educat., Lehigh Univ., M.E., 1902; M.S., 1906; ScD. (Hon.) 1922. Lehigh Univ. Teaching Staff, 1902-12; Amer. Cyanamid Co., 1912 to date. Author numerous contributions on electro chemistry, particularly on the subject of Nitrogen Fixation. Memb., Amer. Elec. Chem. Soc., (pres., 1920-21). Hobby: European literature. Address: American Cyanamid Co., 535 Fifth Ave., New York City.

**Pardee, James Thomas,** vice-president and secretary, The Dow Chemical Company. Born, Cleveland, O., 18 Sept. 1867. mar., Elsa M. Uhinck, Cleveland, O., 21 Feb. 1914; educat., Central High Schl., Cleveland, O., 1884; Case Schl. Applied Sci., Cleveland, O., B. S., 1888. The Variety Iron Wks. Co., Cleveland, O., draftsman, later struct. engr., 1888-93; City of Cleveland, engr. in charge bridges & viaducts, later charge river & harbor improvements, 1893-1901; asst. chief engr., dept. pub. wks., 1901:04; The Dow Process Co., secy., treas., 1895-97; The Dow Chemical Co., vice-pres., 1897 to date; secy., 1916 to date Chem. State Savings Bank, dir.; Corp. Case Schl. Applied Science, mem.; Midland Community Center, Trustee. Memb., Amer. Soc. Civil Engrs., Phi Kappa Psi; rep. The Dow Chem. Co. in following: Synth. Org. Chem. Mfgrs. Assn., Manuf. Chem. Assn., Amer. Drug Mfrs. Assn., Natl. Whol. Whol. Drug. Assn. Clubs: Union (Cleveland), Midland Country. Hobby: travel. Address: The Dow Chemical Company, P. O. Box 26, Midland, Michigan.

**Ruhm, Herman D.,** vice-president, Ruhm Phosphate & Chemical Co. Born, Nashville, Tenn., 6 June 1871; mar., Margaret J. Ingram, Columbia, Tenn., 29 Mar. 1899; children, 1 son; educat., Fogg High, 1887, salutatorian; Vanderbilt Univ., B.E., 1892; Post grad. work in Eng. 1892-93. N. C. & St. L. Ry., 1888-93; Phosphate Bus., Tenn., 1894-1909; Niagara Alkali Co., Niagara Falls, pres. and gen. mgr., 1909-16; Marden Orth & Hastings Corp., mgr. chem. dept., 1916-19; Calco Chem. Co., vice-pres. 1920; bus. for self as chem. broker and vice-pres. R. P. & C. Co., 1920 to date. Pioneer in phosphate rock ind., continuously connected with it and fertz. ind., 33 yrs. First successful mfr. caustic potash in U. S. Contributed various articles, phosphate and potash, paint and varnish and raw materials. Memb., Beta Theta Pi, K.P., Ind. Order Odd Fellows. Clubs: Paint, Oil & Varnish (pres. N. Y., 1923-24), Rotary, Drug & Chem. (N. Y.), Graymere Golf, Columbia, T. Hobbies: golf, game chickens, development of southern resources, and effort to increase use of raw ground phosphate rock by farmers. Address: Ruhm Phosphate & Chem. Co., Mt. Pleasant, Tenn.



# Chemical Backgrounds

## By Williams Haynes*

TO BEGIN again with sulfuric acid: the raw material used by our earliest manufacturers was brimstone imported chiefly from Italy, and contrary to European practice during the last half of the past century, we continued to use the crude sulfur to the almost exclusion of pyrites. In fact, from 1793 to 1895 there was no material change, either in the chamber process or in the raw material employed, although there had been an astonishing, steady increase in output:

During the closing years of the last century two new factors were thrust into the sulfuric acid industry. The recovery of sulfur dioxide from smelter gases brought by-product acid on the market. The contact process of direct manufacture was perfected.

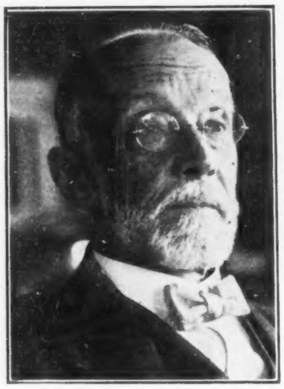
### The First By-Product Sulfuric Acid

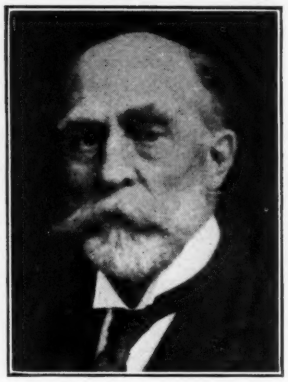
The recovery of sulfur from smelter fumes and its conversion into acid had long been preached by chemists; but it was not practiced by our metal refineries until the development of other industries in the western states, especially the petroleum industry, created a nearby market from the acid made from the waste. In 1895 Matthiesson & Hegeler first made by-product sulfuric acid from zinc ores at La Salle, Ill. and ten years later, when the Tennessee Copper Company started their huge operation at Copperhill, Tenn., the total by-product acid, produced from copper, zinc, lead smelters and from blast furnace operations was about a sixth of our entire production. Although but an inconsiderable proportion of the total output, this by-product acid has been a determining factor in prices at St. Louis, Chicago, and to a lesser extent in New York, while the enormous operations of the Tennessee Company leave literally fixed prices in the large consuming field of the southern fertilizer industry.

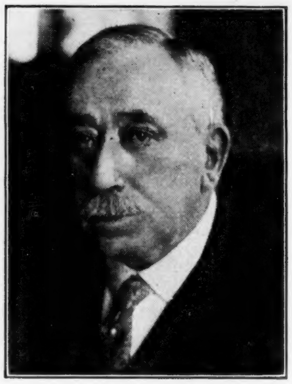
### The First Contact Acid Plant

The threat to our established acid makers of this by-product acid seemed mild compared with the promise, confidently made by technologists, that the contact or catalytic process would make every lead contact chamber obsolete. The new process dispensed with the use of nitric acid and the product it turned out was considerably stronger than it was possible to produce by concentration of the chamber acid. In perfecting this new contact process, the Badische Aniline Co. (which required highly concentrated acid of great purity in several of their dye making operations) had invested ten years of costly research, and they demanded so exorbitant royalties for their patents that, thoroughly frightened as the American chamber acid manufacturers were, none felt they could afford to meet the German terms. Just at this time a personal friend of August Hecksher of the New Jersey Zinc Co. informed him of a contact process invented by Grillo and Schroeder of Darmstadt which did not interfere with the Badische rights. Mr. Hecksher was quick to seize this opportunity, and

**The picture heading the page is that of Powers & Weightman's Laboratory; Falls of Schuylkill, Philadelphia, 1850.*







*At the left is August Heckshe r who established the first contact sulfuric acid plant. William H. Nichols (right) instigated the first step towards chemical mergers with the formation of the General Chemical Co.; while W. B. Cogswell (center) was the prime mover in establishing America's alkali industry.*

thus the first contact acid plant in America was erected in 1901, by a subsidiary of the zinc company, at Mineral Point, Wisconsin.

In the meantime the foreign threat had been very helpful in effecting the organization of the General Chemical Company (1899), in which Dr. William H. Nichols banded together in a single corporation eight smaller chemical companies, operating a dozen acid plants. Individually several of these American acid makers had been approached by the Badische people with the view of leasing the German patents: as a group their first effort was to develop a competitive process. In this they were signally successful, due to the work of J. B. F. Herreshoff, chief chemist of the Laurel Hill works of the Nichols company. With the Herresheff process as a trump card in their negotiations, the General Chemical Company was able to acquire the American rights to the Badische patents upon favorable terms. Other American manufacturers were working along the same lines and by 1903 Schoellkopf, Hartford and Hanna had a unit of their Mannheim contact process in operation at Buffalo, while three years later the Merrimac Chemical Co. perfected the Tentelew process.

## The Old Chamber Process Continues

Despite this frantic development of contact acid plants during the first decade of the century, the promised annihilation of the old chamber process and the elimination of the by-product acid from the market did not follow. Both economic and technical factors combine to preserve the elder plants.

Technically, the contact process in its earlier development encountered great difficulties in the poisoning of the catalyst by impure gases. Commercially, the development of the contact process depended upon a large market for pure concentrated acid. The technical difficulties were solved partly by improvements in apparatus and design and partly by the employment of virtually pure brimstone which came into the market at this time at a favorable price, thanks to the successful operation of the Frasch process of syphon-mining carried on in Louisiana by the Union Sulfur Co. The American acid demand at that time, however, presented a positive handicap to the concentrated acid. True, the petroleum companies found the acid best for their refining operations and soon became large consumers; but the great market, prior to the War, was for the treatment of phosfate rock by the fertilizer manufacturers. They used roughly half of the sulfuric acid produced; and they were at once quite indifferent to such impurities as lead and arsenic, and extremely concerned to purchase their acid at as low cost as possible. Furthermore, the chamber acid makers helped themselves materially by discarding thumb-or-rule operations, and once they attacked their production problems seriously in the scientific spirit, they were able to effect refinements in apparatus and increases of output which resulted in 25 per cent improved efficiently and a net saving of some 20 per cent in plant costs. This market situation was quite reversed, as we shall see, by the World War: but it is significant that first step towards chemical consolidations (the organization of the General Chemical Co.) was initiated by the commercial effects of a technical advancement abroad (the perfection of the Badische contact process).

## Nitric Acid Produced in 1832

About all these chemicals manufactured directly or indirectly from sulfuric acid much of the chemical development has revolved. For example, the first American manufacturer of nitric acid was Carter and Scattergood who began operations in 1832 at Philadelphia. At the same time they produced salt cake and hydrochloric acid. There was then but a very limited demand for nitric acid, which assumed commercial importance only with the nitrating of organic substances to produce nitro-benzene and pricic acid, and which found its first really important use in the manufacture of nitro-glycerin.

Second in industrial importance to sulfuric acid are the alkaline, soda ash and caustic soda. Chiefly because the ocean transport of these solids did not involve the risk and expense associated with the importation of acids, our domestic manufacture of soda products was delayed; and until 1885 our supplies were drawn from the efficient and well organized

alkali industry of Great Britain. The development of the British alkali industry had been closely associated, as we remember, with the Industrial Revolution in the textile industry, and its introduction into this country had similar connection.

The Solvay process, discovered in 1863, had been successfully introduced into England by the Monds. Its valuable by-products, the growth of our textile, paper and glass industries which promised a profitable American market, and the development of domestic supplies of ammonia all combined to make the transplantation of the process an economic feasibility. Rowland Hazard, member of a family long prominently identified with textile interests in Rhode Island, was interested in the project by W. B. Cogswell; an agreement was entered into with the Belgium house of Solvay & Co.; and a plant was erected at Syracuse, N. Y., close to an abundant supply of natural brine. On January 10th, 1884, operations began. The initial unit, designed to produce fifty tons a day, fell far short of projected capacity; but improvements and labor saving devices were perfected by the American staff which in the end increased the output to a tonnage of one hundred and fifty tons daily.

## Michigan and Mathieson Enter Alkali Field

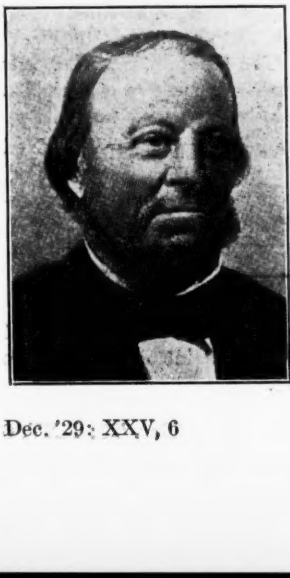
This success prompted the organization of two other American alkali companies, the Michigan Alkali Works (1892) and the Mathieson Alkali Works (1893). Both companies brought over English technical men for the construction and initial operation of their plants and both settled their location, the former at Wyandotte, Mich. and the latter at Saltville, Va. close to salt brine wells. At this time (1893) our imports of soda ash totalled 388,910,183 lbs. valued at $4,855,098. Ten years later they had dropped to 24,688,625 lbs. worth $232,201. During the same period the importation of caustic soda fell from 57,485,106 lbs. to 2,657,751 lbs. valued respectively at $1,344,525 and $66,176.

Following the example of the Ford family, who prior to their organization of the Michigan Alkali Works had been engaged in the glass business, two other groups among the big consumers of soda ash subsequently embarked upon alkali manufacture in order to supply their own requirements. In 1899 the Pittsburgh Plate Glass Company organized the Columbia Chemical Company with a plant at Barberton, Ohio; and in 1910 the Macbeth-Evans-Flackus Glass Companies, joined with the Hazel-Atlas Glass Works and the Proctor and Gamble soap interests, in the establishment of the Diamond Alkali Company. These new producers not only removed from the consuming demand the considerable alkali requirements of their backers; but both also produced a surplus which they quite naturally sought to market to other consumers. Consequently the alkali output was for several years in excess of the country's normal demands. A bitter price war ensued. Since the manufacture of alkalies is predicated upon the sale of large tonnages of low-priced materials at a close margin of profit. (a type of industry which with its heavy plant investments is notably vulnerable to price cutting, this highly unsatisfactory market condition seriously jeopardized the stability of what had become one of the most important sections of the chemical industry. Had those conditions obtained over a long period of years there would undoubtedly have been serious casualties—either outright failures or consolidations—but the entire market situation was changed in 1914 by the enormously increased consuming demand for alkalies created by the World War.

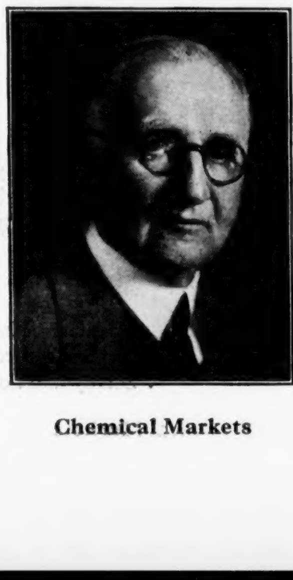
The introduction of the electrolytic process of alkali manufacture has had far-reaching technical and economic effects. It sounded the death knell of the old LeBlanc process. It heralded the beginning of the end of British domination over the alkali markets of the world. It gave industrial chemistry two new raw materials, chlorine and hydrogen, both produced cheaply, abundantly, and of remarkable purity.

## Developing a Chlorine Market

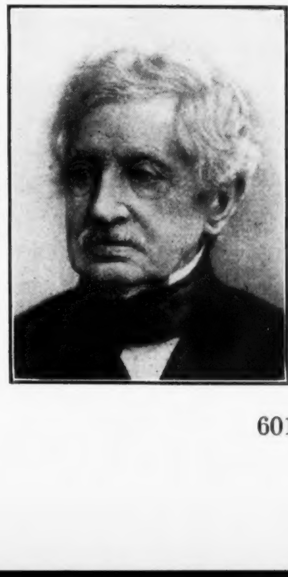
The ultimate triumph of the electrolytic process is intimately bound up with the development of a market from its chlorine as a substitute for bleaching powder in the textile and paper industries. Although Charles Lennig had made bleaching powder at his Bridesburg plant as early as 1847, nevertheless British material, produced as a by-product of the LeBlanc process, was supplied here so cheaply by producing caustic and



*Martin Kalbfleish (left) founder of the Kalbfleisch Corp.; George D. Rosengarten (right) one of the earliest of the*



*Philadelphia chemical fraternity; and Herbert H. Dow (center) one of the pioneers in the manufacture of electrolytic chlorine.*



chlorine gas that it dominated the market. Despite the difficulties of transportation and the instability of the hypochlorite with its resulting waste, domestic production had to wait for the development of a process which gave other marketable chemicals. The electrolytic manufacture of caustic soda met these requirements which in the early operations was absorbed in lime and marketed as bleaching powder.

### First Production of Electrolytic Chlorine

The first commercial manufacturer of electrolytic chlorine in America was the Electro-chemical Co. at Rumford Falls, Maine. This plant was shortly sold to the Burgess Sulphite Fibre Co. who moved it to Berlin, N. H. where they did some of the pioneer work in the bleaching of wood pulp by the direct use of chlorine. In 1895 two trail-blazers of the electrolytic industry began operations, the Mathieson Alkali Works at Saltville, Va. and the Dow Chemical Co. at Midland, Mich. Both installations were frankly experimental. Both were successful. Two years later, both companies expanded their operations. On Thanksgiving Day 1897, Dr. Herbert H. Dow formally threw the switch that started the current of 400 kilowatts at the enlarged Midland plant. The Dow operation was directed towards the production of caustic soda and chlorine for use as raw material, and the production of either has always been incidental.

This same year, the new Mathieson plant came into production at Niagara Falls, N. Y. Not only was this the first important electrolytic alkali plant in the country (its capacity was originally ten tons of caustic soda daily) but it was also the first chemical enterprise at Niagara Falls, where is now centered the greatest group of electro-chemical industries in the world. Mathieson was followed the very next year at Niagara Falls by the Castner Electrolytic Alkali Company, and in 1906 by the Hooker Electrochemical Company. In the meantime, the Pennsylvania Salt Manufacturing Company, which for years had been manufacturing soda out of cryolite at Matrona, Penn. had opened an electrolytic alkali plant at Wyandotte, Mich. in 1903.

All these plants transformed their chlorine in bleaching powder, and statistics reveal the rise and fall of this chemical in our American markets. In 1892, the year of the Mathieson and Dow experimental plants, our imports of bleaching powder were 55,374 tons valued at $1,839,640. By 1905 these figures have shrunk to 48,059 tons at $776,281: by 1914 to 24,248 tons at $416,893. During the same period our domestic production had grown from an insignificant figure to a total of over 100,000 tons, not taking into account considerable quantities produced by electrolytic methods for their own consumption at many pulp, paper and textile mills.

*(To be concluded)*

## Germany Using New Process for Ammonium Sulfate Recovery

Recovery of ammonia as sulfate in gasworks and elsewhere is now confronted by so many economic difficulties that any process which promises to lower costs deserves serious consideration, says "Chemical Age." A German chemist, Dr. M. R. Tern, of Zinnowitz, has lately been developing a process whereby the production of the sulfate is carried out without the use of sulfuric acid, and the process is said to have been successfully tried out on the large scale in Germany, where it has been attracting a good deal of attention.

The process looks comparatively simple. The ammonia is driven off by steam. For the production of sulfur trioxide, the spent oxide of the gasworks is roasted, and the sulfur dioxide evolved converted to trioxide in an electric arc. The trioxide and ammonia are then precipitated as ammonium sulfate in an electrofilter, the moisture of the gases and of the air present sufficing for the purpose of the reaction. The amount of current used in the process (which is known as the Tern "Elektrostickstoff" system) is so small that by its use the saving through the obviation of sulfuric acid is sufficient to pay in a short time for the installation of the simple apparatus required. The ammonium sulfate obtained, known as "Elektroammon," is pure white, and contains about 20 per cent. of nitrogen. Installations having an annual output of 37,000 tons per annum are projected in Germany, where a large plant has already been in operation since the beginning of July at the gasworks at Engelsdorf-bei-Leipzig. The cost of production of "Elecktroammon" per 1,000 kg. is said to be from 90 to 100 Reichsmarks less than that of ammonium sulfate as hitherto prepared in the gas industry. According to experiments carried out by the Pomeranian Chamber of Agriculture, "Elektroammon" is equivalent as a fertilizer to ordinary ammonium sulfate. The process, especially on account of its elimination of sulfuric acid, has an obvious interest for all makers of by-product sulfate.

## Japan's Soda Caustic Production Supplies Only One-Third of Needs

Japan's production of caustic soda is only about one-third of the annual requirements of about 87,500 tons. Its quality is not satisfactory for use in the rayon industry, which is expanding rapidly. The liquid chlorine, which is produced as a co-product of the electrolytic caustic soda, is used for the manufacture of bleaching powder under the "Nelson" or "Nekano" process. The Asahi Electric Industry Co., Toyama, and the Dai Nihon Artificial Fertilizer Co., whose office is in Tokyo, are the principal caustic soda producers. There are three other smaller companies. Great Britain supplies over half the caustic soda imports and the United States about one-third, according to Department of Commerce.

Synthetic fertilizer may be produced on a large scale in Japan if the reported plan of the Mitsui Mining Co. is carried out. The plan calls for the establishment of a large ammonium sulfate company with a capitalization between 10,000,000 and 30,000,000 yen. (The yen is about 44 cents). The Mitsui Mining Co., it is pointed out, holds the licenses for producing sulfate of ammonia in Japan by means of the Claude process.

Whether the capitalization of the new company will be fixed at 10,000,000 yen at first, subject to increase in the course of time, is to be submitted to a general meeting of the company's shareholders shortly, reports the Department of Commerce.

Union Chimique Belge effects series of mergers by which it secures control of eight other companies including Mutuelle Solvay and Societe Anonyme Cuivre.

# *The Edeleanu Process*

## Creates a New Use for Liquid Sulfur Dioxide In the Refining of

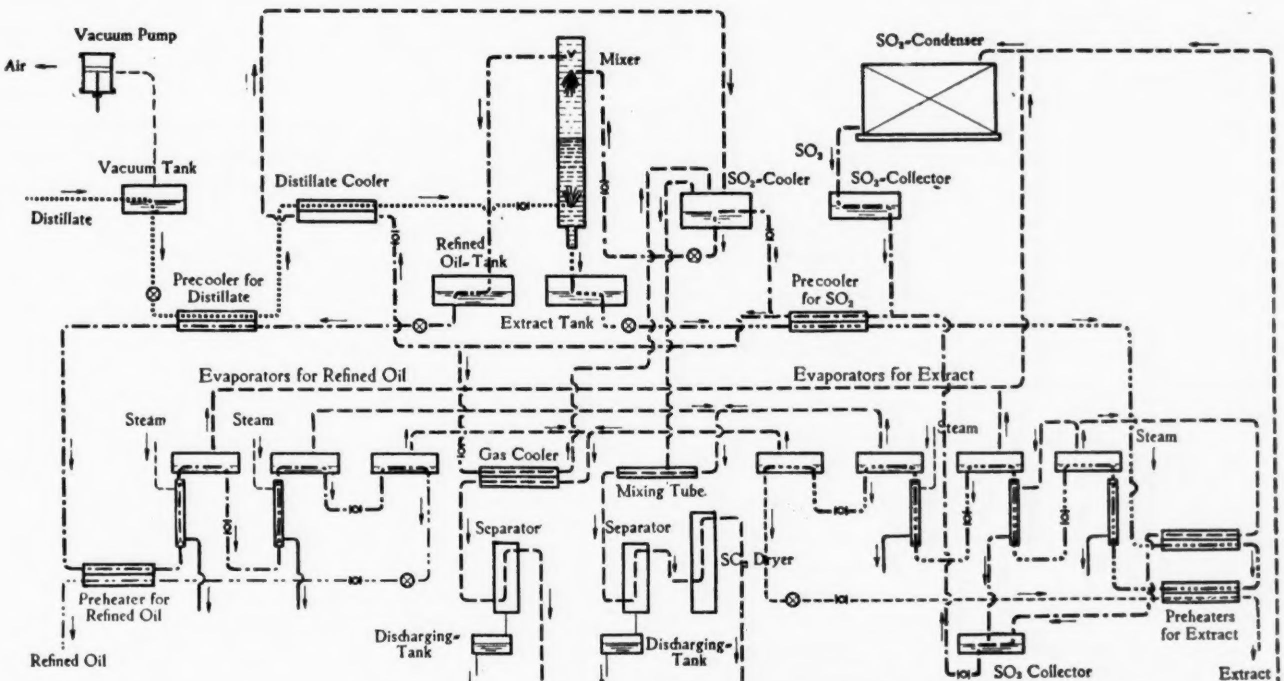
# *Petroleum Distillates*

By Robert L. Brandt*

*Technical Assistant to Doctor Edeleanu*

IT MAY be said that of all the proposed substitutes for sulfuric acid for use in the refining of petroleum distillates, thus far the only one that has been successful in a commercial way is liquid sulfur dioxide. The Edeleanu process, using liquid sulfur dioxide as a refining agent is the result of 20 years' experimentation and development. During this time the process has evolved from a cumbersome batch method applicable to the refining of kerosene only, to a modern, continuous, high capacity system, in which all types of distillates ranging from the heaviest lubricating stocks to pressure distillates are processed.

Essentially the process is a simple one. It is based on the facts that at low temperatures liquid $SO_2$ readily dissolves aromatic, unsaturated, sulfur, nitrogen, asphalt, and other compounds, and on the contrary has practically no solvent effect upon paraffin and naphthene hydrocarbons. If equal volumes of a raw distillate and liquid $SO_2$ are mixed together at about 14 degrees Fahrenheit and then allowed to stand, two layers of liquids will immediately be formed. The lower layer consisting of the bulk of the




*Flow sheet of the Edeleanu process showing modern continuous plant*

*Reprinted from "The Oil and Gas Journal".

original $SO_2$ containing in solution the impurities present originally in the raw oil, and the upper layer refined oil. A regular plant consists of apparatus that cools the raw distillate and $SO_2$, mixes them in the proper proportions, separates the refined oil from the extract, and recovers the spent $SO_2$ for recycling in the system.

The first step in the process consists in removing water from the raw incoming distillate. When treating heavy lub oils this is accomplished by blowing the stock with air in conventional blow pans. In the case of lighter oils dehydration is effected by passing the distillate by gravity from the refinery feed tank through a small tower (not shown) filled with rock salt. From this apparatus the stock is dropped into a capacity tank and then passed to an elevated horizontal tank where any air dissolved in the oil is removed by means of a vacuum pump, whose suction is connected to a dome on top of the tank.

The distillate is now ready for processing. It is picked up from the bottom of the vacuum tank by a centrifugal pump, and passed in series through two sets of double pipe cold exchangers, where its temperature is reduced to the desired point previous to its entry into the mixer. In the first unit cooling is accomplished by means of cold raffinate (refined oil) that has already passed through the mixer. In the second unit, liquid $SO_2$ is evaporated in the inner pipe of the double-pipe cooler; the cooling of this distillate being obtained on the same principle as in a regular ammonia refrigerating coil. The cold distillate next enters near the bottom of the mixer for treatment with cold liquid $SO_2$. Light oils require from between 50 and 100 per cent $SO_2$ by volume for treatment, while the heavier oils require somewhat more. The amount of $SO_2$ necessary is entirely dependent upon the character of the distillate at hand, and upon the degree of refinement desired. The mixer for light oils is a hollow verticle tower about 30 inches in diameter and 20 feet high. It is heavily insulated with cork to prevent thermal losses, filled with Raschig rings to promote intimate mixing of the oil with $SO_2$, and is fitted with sight glasses for control purposes. Cold raw distillate enters near the bottom, passes through a spreader, and rises to the top of the tower. Fresh cold $SO_2$ enters near the top of the tower, passes through a spreader, and drops to the bottom scrubbing the counter-flowing stream of distillate in its descent. Due to the selective solubility effect of cold liquid $SO_2$ for aromatic, unsaturated, sulfur, nitrogen, asphalt, and other compounds, the distillate is freed from these impurities in its passage through the tower.

Separation of the raffinate and the extract takes place readily, on account of their large differences in specific gravities. We thus have a stream of raffinate continuously discharging from the top of the mixer into the refined oil tank, and from the bottom of the tower a stream of extract flowing to the extract tank. The extract consists of around 85 per cent $SO_2$ and 15 per cent oil, while the raffinate contains about 10 per cent $SO_2$. The next steps in the process are to recover the $SO_2$ from the raffinate and extract for re-use in the system. The handling of the raffinate will be discussed first.

### Operating Cost of an Edeleanu Plant Treating Lubricating Oil

**Capacity 500 tons per day (3,500 bbls.) using 200 per cent sulfur dioxide (by volume).**

**Assume the plant to be driven by electricity, and the evaporators to be heated principally with exhaust steam.**

**Electrical Power: 10,080 KWH per day, 1 KWH at 1 cent, or $100.80.**

**Steam: 338,000 pounds exhaust steam, 1,000 pounds at 10 cents, or $33.80; 42,000 pounds live steam, 1,000 pounds at 50 cents, or $21.**

**Water: (recooled and reused) 100,000 gallons per day, 1,000 gallons at 2.2 cents, or $2.20.**

**Sulfur Dioxide: 2,250 pounds per day, 1 pound at 1.8 cents, or $40.50.**

**Labor: 3 foremen, each $8 per day, and 7 operators, each $6 per day, or $66.**

**Maintenance and Repairs: $12,000 per year (360 days), or $33.33.**

**Supplies: $3,500 per year (360 days), or $9.72.**

**Total cost per 24 hours of $307.35.**

**Operating cost per metric ton of distillate, $0.615.**

**Operating cost per barrel of distillate, $0.088.**

### Flow of Refined Oil

Connected to the bottom of the refined oil tank is a centrifugal pump that passes the raffinate through the previously mentioned double-pipe cold exchanger, the distillate precooler. In this apparatus it is warmed to about atmospheric temperature, and in turn it cools the raw entering distillate to around 30 degrees Fahrenheit. It next flows through the preheater, a double-pipe exchanger, where its temperature is raised by means of the counter-flowing stream of hot raffinate discharged from the final evaporator. From the preheater the raffinate passes through a nest of steam-heated tubes connected to the evaporator, where its temperature is raised to about 150 degrees Fahrenheit, finally entering the shell of the evaporator where separation of the oil and gaseous $SO_2$ takes place. The hot $SO_2$ gas is led directly from a small dome on top of the shell to a conventional water-cooled condenser located outside of the Edeleanu plant building.

The hot raffinate, still containing some $SO_2$ is forced by the vapor pressure of the $SO_2$ in the first effect to the medium stage evaporator. Its temperature is maintained constant by means of steam. The vapor space of this effect is connected to the suction of compressors that maintain about a 10-inch vacuum upon the apparatus. Removal of the final traces of $SO_2$ from the raffinate is accomplished in the final or low pressure evaporator, where a vacuum of about 30

inches is held by means of vacuum pumps. The passage of the $SO_2$ gas to the compressors and vacuum pumps will be discussed later in detail. Finished raffinate is removed from the bottom of the shell of the final evaporator by means of centrifugal pump, and from this point passes through the preheater, where it is cooled, to a refinery rundown tank.

### Recovery of $SO_2$

Recovery of $SO_2$ contained in the extract is accomplished along similar lines. Extract at about 10 degrees Fahrenheit is passed from the extract tank through a series of interchangers by a centrifugal pump at about 150 pounds pressure. First through the $SO_2$ precooler, a double-pipe exchanger, where it is warmed to nearly atmospheric temperature. In turn it cools the liquid $SO_2$ in its passage from the $SO_2$ collector to the $SO_2$ cooler. Then through the first stage of the extract preheater where it is further heated by the latent heat of condensation of the condensing $SO_2$ that has come from the first, or high pressure stage, of the extract evaporators. Next, through the second stage of the preheater, where its temperature is raised by the hot bottoms or finished extract discharged from the final stages of evaporation; finally through a nest of steam-heated tubes connected to the shell of the high pressure evaporator where its temperature is raised to about 170 degrees Fahrenheit.

The hot $SO_2$ gas separates from the liquid in the shell, is led out of the dome, and split two ways; one portion passing to the first section of the preheater where it is condensed as previously described. The liquefied $SO_2$ passes to the collecting tank. The remaining portion of hot gas is passed into the shell surrounding the nest of heating tubes connected to the second evaporating unit, where it gives up its heat to the bottoms passing from the first to the second evaporator, is condensed, and passes to the $SO_2$ collector.

Since the pressure of the extract is reduced upon entering the heating tubes of the second evaporator $SO_2$ is vaporized, and the heat of vaporization required is supplied by the latent heat of condensation of the hot $SO_2$ gas condensing on the outside of the tubes. In this manner great heat economy is effected as may be seen from a little consideration of the steps involved. The hot $SO_2$ gas evolved from the second stage is combined with the gas from the first stage raffinate evaporator and led to the water-cooled condenser, where it is liquefied and dropped into the $SO_2$ collecting tank. The pressure on these units will therefore depend on the temperature of the cooling water flowing over the condenser coils and, under average conditions, will be about 50 pounds per square inch. The extract remaining in the second stage evaporator is next passed in series through the medium and vacuum stage evaporators.

The gas evolved in the medium stage unit is first combined with that from the medium stage raffinate effect, and then with the cold gas coming from the $SO_2$ cooler, passed through a sulfuric acid drier (to remove any water) and finally to the suction of the compressors, where it is compressed and discharged to the water-cooled condenser. The gas issuing from the final stages of evaporation of both the raffinate and extract evaporators is combined, cooled to about 30 degrees Fahrenheit in the $SO_2$ gas cooler for removal of the slight traces of oil that come over, and passed to the vacuum pumps. These pumps discharge to the suction side of the compressors, which in turn discharge to the condenser. So all the $SO_2$ used in the system eventually passes to the collecting tanks and from these points starts a new cycle through the plant.

There only remains a description of the cooling of the $SO_2$ before use in the mixer. As has been shown, all $SO_2$ eventually gathers in the collecting tanks.

Under its own vapor pressure it flows through the $SO_2$ precooler where it drops in temperature to about 30 degrees Fahrenheit. This cooling is effected by the cold extract flowing counter-currently in its passage from the extract tank to the preheater as has previously been described. The final cooling of the liquid $SO_2$ is done in the $SO_2$ cooler. This apparatus is a horizontal tank whose vapor dome is connected to the suction of the compressors. By holding the vapor pressure of the $SO_2$ in this tank to around 12 pounds per square inch absolute thermal equilibrium of the liquid $SO_2$ obtains when its temperature is about 5 degrees Fahrenheit. That is, by evaporating a portion of the incoming stream of liquid $SO_2$ cooling of the remainder is obtained at the expense of the

## Operating Cost of an Edeleanu Plant Treating Kerosene and Light Oils

**Capacity 500 tons per day (3,800 bbls.) using 75 per cent. sulfuric dioxide (by volume).**

**Assume the plant to be driven by electricity, and the evaporators to be heated with exhaust steam.**

**Electrical Power: 7,320 KWH per day, 1 KWH at 1 cent, or $73.20.**

**Steam: (exhaust steam) 232,200 pounds per day, 1,000 pounds at 10 cents, or $23.22.**

**Water: (recooled and reused) 70,000 gallons per day, 1,000 gallons at 2.2 cents, or $1.54.**

**Sulfur Dioxide: 2,500 pounds per day, 1 pound at 1.8 cents, or $45.**

**Labor: 3 foremen, each $8 per day, and 7 operators, each $6 per day, or $66.**

**Maintenance and Repairs: $12,000 per year (360 days), or $33.33.**

**Supplies: $3,500 per year (360 days), or $9.72.**

**Total cost per 24 hours, $252.01.**

**Operating cost per metric ton of distillate, $0.504.**

**Operating cost per barrel of distillate $0.067.**

intrinsic energy of the liquid, and its temperature must drop. A centrifugal pump connected to the bottom of the cooler feeds the mixer.

### Treating Lub Oils

When treating heavy lub oils another form of mixing device is used. Three small tanks are individually connected to three small mixing chambers to which are attached motor-driven paddles. The oil and liquid $SO_2$ are passed in counter-current series from one tank to the other via the mixing chambers where it is thoroughly mixed by the paddles. The principle is exactly the same as in the mixer previously described; however, due to the high viscosity of heavy lubs at low temperatures intimate contact between the oil and $SO_2$ cannot be obtained without resort to mechanical mixing.

Suitable valves, meters, liquid-level gauges, pressure and vacuum gauges, allow the operators perfect control at all times. In addition, each piece of apparatus is connected by piping to a centrally located control board in order that pressure or vacuum may be applied if desired. This is necessary for cleaning out purposes. The equipment is so arranged that an operator standing in front of the mixer is able to observe all important liquid level and pressure gauges in the plant.

The largest plants require three men per eight-hour shift, and the smaller units two. Operation is on a 24-hour basis, with complete shutdowns necessary about once every three months. A well-organized shut down lasts 8 to 10 hours. Years of experience prove that no corrosion obtains in a properly managed plant. By means of the highly effective $SO_2$ recovery system, the loss of $SO_2$ is reduced to an economically negligible amount. This will be shown in the tables of costs.

### Results

Lub Oils. It has been shown that in all cases when refining with $SO_2$ that a considerable rise in gravity is obtained, and that the sulfur content, the Conradson carbon, and the sludge value are reduced. Tests upon all types of oils have shown that when refined with $SO_2$ a considerably flatter viscosity curve results. This point is of great importance as it means that at high temperatures such oils retain their viscosity in contrast to sulfuric acid refined stocks. Tests conducted over a long period of years indicate that $SO_2$ refined lubs hold their color better, are more resistant to oxidation, give less sludge, and form a minimum of acid and carbon in actual usage.

Transformer oils have a far lowered tendency to sludge, while turbine oils do not emulsify nearly so readily. These properties are quite easily explained by the facts that $SO_2$ removes the undesirable components from the raw distillates more completely than sulfuric acid; further no chemical action between the oil and $SO_2$ is obtained as in the case when treating with sulfuric acid.

In the case of kerosene, the burning and lighting qualities are vastly improved and the tendency of $SO_2$ refined oils to go off color, and to deposit resins is practically eliminated. The almost complete removal of aromatic and unsaturated compounds and particularly the lack of formation of oil soluble compounds (as is the case when treating with sulfuric acid) is the reason for such satisfactory results.

It has been found for example, that in certain cases, such as with some Californian, Texan, Louisianan, and other crudes, that it is economically impossible to obtain satisfactory products by ordinary acid treatment owing to the excessive consumption of acid and to the very low yields.

### Pressure Distillate

In some cases, cracked or pressure distillate may be processed in the Edeleanu system in such a manner that the anti-knock properties of the finished gasoline made from the pressure distillate are greatly improved.

This is accomplished by splitting the pressure distillate into two fractions, treating the heavier fraction with $SO_2$ and combining the extract produced with the lighter fraction. The improved anti-knock properties result from the increased aromatic and unsaturated content of the gasoline.

### Extract

One very important point remains to be covered. When treating oils ordinarily with sulfuric acid an unavoidable loss occurs. In most cases the acid sludge that is formed is a total loss.

In the Edeleanu process only a clean oil, extract, is formed. It may be handled directly at least as fuel oil, or in the case of the extract resulting from the treatment of kerosene as Diesel fuel. It may also be re-run when an excellent anti-knock motor fuel is obtained. Its high nondetonating qualities result from the aromatic and unsaturated content.

### Costs

The final worth of any process leaving aside considerations as to the material advantages, is determined largely by the economical aspect. The accompanying tables are therefore of great interest in this connection, since a little study of them will show that in comparison to other methods of refining, the cost of treatment per barrel by $SO_2$ is less than by any other method when the quality of the finished products is taken into account.

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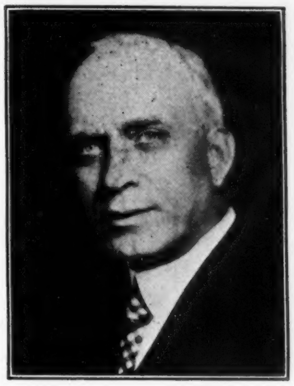
**Manufacture in Italy of acetone and butyl alcohol by the fermentation process is carried out by one company only, the Distillerie Italiane S. A., which commenced production on the American process at the end of 1927. The present production of the firm is at the rate of 1½ tons of acetone and 3 tons of butyl alcohol per day, the butyl alcohol being used in another plant of the concern for the manufacture of butyl acetate. The company has a capital of 130 million lire and for 1928 (its first year) made a profit of 13 million lire, declaring a dividend of 9 lire on each 100 lire nominal share. New plants are being erected in Savona and the present plant at Sesto S. Giovanni is to be extended.**

# A Program *for* Inter-Industry Co-Operation



**A million dollar budget — that is the ambitious program of co-operative work which Mr. Rowell proposes for these chemical industries concerned with fertilizer problems—a sort of super-Institute, a model by the way for what has been proposed for many years for our industry.**

By L. W. Rowell
*President, National Fertilizer Association*

WE HEAR a great deal about the new thought in business. This seems to cover everything from finance to combinations in distribution. The changes are amazing and mystifying, and just where they will lead us is yet to be disclosed.

Huge banks, each formerly looked upon as the highest development in the banking field, have been merged into one tremendous bank with resources into the billions.

Investment trusts have, in a few years, sprung from insignificant proportions to a capital investment of over three billion dollars.

### Holding Companies For Efficiency

Huge holding companies with their experts in manufacturing, management, and selling, are claiming a superior efficiency in the management and in the development of the many companies under their control.

Large business institutions, without any apparent connection, have merged to develop a more effective and economical delivery service to the retailers handling their goods.

We have one chain store combination after another. We buy everything from a toothbrush to a suit of clothes from a chain store.

We have manufacturers absorbing retail units and developing an enormous retail chain, to make a short cut to the consumer, and thus reduce to a minimum the cost of distribution, and to enable them to use a reduced field force as service men instead of salesmen.

We find more and more associations or voluntary chains being formed for co-operative purchasing, so that independent merchants can have relatively the same buying power as the big chain.

One retail food chain alone boasts of sales of more than a billion dollars for the past year on a cash and carry basis.

Trade associations of allied industries are merging or negotiating in regard to a merger. The directors of the Associated Grocery Manufacturers of America, Inc., for example, recently adopted the following resolution:

> "Resolved, That it is the sense of this board that mergers with associations, whose members are engaged in the manufacture of products distributed through the grocery trade, are to be encouraged when of mutual advantage. The members of such associations are to be invited to membership in this association, under the requirements of the constitution pertaining to membership, and that those who become members, under such merger arrangement, be invited to form within the association a section for the consideration of specific problems in which members of their group alone are interested."

Machinery is being established by most all Associations to enforce their codes, or in other words, to see that the business game is played according to the rules that the different players have agreed to abide by.

### The Modern Trend in Business

These developments, as stated above, are complex almost beyond man's understanding, but they do suggest something, and expressed in a few words, this is what I get out of it:

The consumer must be sold at the lowest possible cost, quality and service considered.

Mass production has been effective in producing goods at a low cost. Now mass selling is being made equally effective in merchandising goods.

That the route from the manufacturer to the consumer must be shortened, and all unnecessary expense and waste eliminated.

That the public wants the business game played according to rules, because they have learned that

they will be better off in the end if the industry makes money and is in position to develop their business to the utmost and pass along the improvements and the savings to them.

And last, but not least, these happenings suggest that business is finding that there can be no monopoly on prosperity, that the manufacturer profits most, who will operate his business so that the other fellow also makes a profit.

These developments suggest changes all along the line—in management, advertising, promotion, and sales work in our individual businesses and in association work, but since the theme for to-day's program is "Working for the Common Good," I am going to enlarge upon what that group of individuals and firms that are directly and indirectly interested in the tons of fertilizer or the kind of plantfood that the farmer uses on his crops, can do for the common good.

Naturally the ones that are interested most are the producers of mixed fertilizers, nitrogen, superphosphate, potash, phosphate rock, and sulphur, and it seems to me that it is this group that must work out some constructive plan for the common good of the farmer, themselves, and allied industries.

### Coordinated Sales Promotion

In my opinion, now is the psychological moment for this group to undertake the job to merge their interests and agree on a co-ordinated policy of research, education, advertising, promotion work, and sales work, and put it into effect through a centralized agency. All of this work could be done under the name of The National Fertilizer Association as well as under any other name, but I think that as the contemplated work is so much broader than the work previously handled by The National Fertilizer Association, some of the interested parties might prefer to operate under some other name. That is a detail, but as a matter of convenience, I am going to refer to the agency from now on as the Plantfood Institute.

Any producer of fertilizer raw materials or any manufacturer of mixed fertilizers or superphosphate would be eligible for regular membership. The membership would be divided into divisions such as the mixed fertilizer division, nitrogen division, potash division, superphosphate division, raw rock division, sulfur division, etc. Each division would elect its own Chairman or officers, and would agree on the funds that they would raise as their contribution to the total fund to be spent under the jurisdiction of the Board of Directors of the Plantfood Institute. The Chairman, or individual designated by each division would represent that division on the Board of Directors; the Board of Directors to decide whether or not there was a proper relationship in the amount of money each division was willing to pledge in connection with the work that was to be done, and an agreement would be reached that was acceptable to the board and to the division.

An organization of this kind should be able to raise a substantial sum of money—let's say a million dollars or more. These are some of the things that I would have it do:

Inaugurate a comprehensive research program in connection with sectional experimental farms, owned and operated by the Plantfood Institute, and with the aid of an advisory board representing state and national agricultural authorities.

Also arrange for a large number of demonstrations by actual farmers on their own farms.

We owe it to ourselves and to our customers, to contribute our share to agricultural research, experimentation, and demonstration. We should not continue to depend upon the United States government and the state experiment stations to develop our scientific facts for us. It is our job to specialize on the kind and amount of fertilizers to use for various crops, on various soils, in different climates.

There is a certain amount of misunderstanding at the present time between the various groups that are in this picture, and this is going to reach the point where there will be an open break, unless each and every group puts its cards face up on the table and faces the issue squarely from the standpoint of—"What can we do to determine for the farmer the kind and amount of fertilizer that will pay him the largest profit from its use ?"

These groups can get together, and eventually will have to get together, but if they get together now, we will accomplish in the next five years what otherwise will take twenty years, but it must be understood that we cannot be selfish; that we must be willing to give and take in our negotiations, and I hope that the members of the various divisions referred to will get together and discuss this matter informally and appoint a representative that in the near future would be willing to attend a meeting of all interested to discuss the plan, and to outline a tentative set-up.

### A National Advertising Campaign

Carry on a national educational advertising campaign, telling the farmers how to use fertilizer, what kind of fertilizer to use, and how much fertilizer to use to make the most money. Allow me to give an opinion here in connection with the present educational and sales work that is being done. Experiment stations and county agents are being overrun with agents representing either the various fertilizer companies, The National Fertilizer Association, or raw material manufacturers. These agricultural workers are complaining that they cannot consider or possibly co-operate in the widely different plans that are urged upon them. County Agents are being asked to conduct demonstrations without the sanction of the County Agent Leader or the extension force of the state. Everyone is advocating his own pet idea, and the farmers are becoming confused, and if something

is not done, all of the time and effort that is being put forth with the idea of increasing the sale of plantfood will result in a decrease in consumption instead of an increase. We cannot blame the farmer when he sees that the experts don't agree on what is the best thing to do, if he waits for the experts to reach an agreement before he gives them his money.

Furnish dealers and others distributing fertilizers with films and electros to be used by them in their local advertising campaigns. These advertisements to carry the same message as the national educational advertisements, but "tying in" those that actually sell the farmer.

Arrange for a department to handle the education of salesmen, and dealers, so that they will use the recommendations of the Institute and thus complete the link from manufacturer to farmer.

Establish machinery for Code of Ethics enforcement.

### Increasing Total Consumption

The different divisions of the Plantfood Institute, the different producers of raw materials, are, of course, vitally interested in increasing the sales of their particular product. No one is going to get behind a program that is unfair to his particular product, but how can anyone refuse to get behind a program that is fair to his product and fair to the farmer who uses it? In the long run, each raw material manufacturer must bear in mind that it is not so much the ratio between nitrogen, phosphoric acid, and potash that counts, (although this is important) but it is the total tons of fertilizer that the farmer can use at a profit. If the total consumption of plantfood in the United States could be increased 50 per cent in the next five years or ten years, every producer of raw materials would show a most satisfactory increase in the sale of his product—and if the volume of sales is not increased everyone is going to be unhappy and feel that the mixed fertilizers manufacturers' machinery is not equal to the job.

Our industry will prosper only if the fertilizer manufacturers have learned the same lesson that others have learned in other industries, namely, that no one can have a monopoly on making money; that he will profit most who conducts his business so that the other man can make money.

We can make money if we will do business in the open—according to the Code and the law—and use our large sales force as service men—to make the dealer a better dealer, to show the farmer how to reduce his costs and make more money—instead of sentinels placed at points of vantage to report the latest reduction in price or secret rebate.

## Leunawerke Extends Production Using Haber-Bosch Process

**Works officials state that the Leunawerke is consuming 18,000 to 20,000 tons of lignite or brown coal daily from its adjoining mines. This brown coal is used for direct firing in connection with the ammonia synthesis and as raw material in the "oil from coal" operation. Experimentation progresses in connection with efforts to produce raw gases, and producer and water gas from lignite, instead of coke and commercial exploitation of this process, is said to be imminent, according to the Department of Commerce.**

Production expansion has resulted in an increase in the number of employes, from 15,000 at Leuna a year or so ago to a present 20,000, or an increase of 25 per cent. during this brief period. Both figures exclude the number employed in building construction in connection with an extension of production.

In describing the Leunawerke Haber-Bosch synthesis in practice, the operation may be conveniently divided into five stages:

1. As the water gas-producer gas mixture enters the operation, it has, of course, as impurities, carbon monoxide and dioxide, as well as hydrogen sulphide. As a first-stage operation, the gas mixture is washed to remove dust.
2. The gas mixture is then filtered through activated carbon, when the hydrogen sulphide combines with a small amount of oxygen added as air, breaking it down to elemental sulphur. The sulphur is washed out periodically with ammonium sulphide, dissolving it to ammonium polysulphide, and the latter, heated at 1,140 degrees Cel., separates molten sulphur, leaving ammonia and hydrogen sulphide for retreatment in the next cycle.
3. The desulphurized gases, containing nitrogen, hydrogen, carbon monoxide, and carbon dioxide, are treated with steam over a catalyst at 50 degrees Cel., when the carbon monoxide is reduced to 1 per cent.
4. The gases are than led to the primary compression operation, where they are compressed in two stages to 25 atmospheres, and thence to the carbon dioxide separation cylinders, in which the gas passes countercurrent to water at the same pressure, removing the carbon dioxide, which is dissolved out by the water. At this point the pressure is released on the water carrying the carbon dioxide, when the latter is given up for later use in the end reaction; that is, ammonia, gypsum, and carbon dioxide, producing ammonium sulphate and calcium carbonate.
5. The gases, now containing nitrogen, and carbon monoxide, are subjected to a pressure of 200 atmospheres, under which conditions they are treated with cuprous ammonium chloride solution, which removes the last traces of the carbon monoxide.

As a final commentary on the extreme economy characterizing the practical operation of this process, it may be mentioned that, as in the case of the carbon dioxide recovery, the carbon monoxide is removed from the cuprous ammonium chloride solution and returned to water gas. The final step is when the pure nitrogen and hydrogen go to the catalyzing furnaces, still under 200 atmospheres pressure and 600 degrees Cel. temperature, where an absolute conversion of 10 per cent. ammonia is had on the first run. The ammonia is washed out with water up to 25 per cent. ammonia solution, and the pure nitrogen and hydrogen are returned through circulating compressors to the catalyst.

The 25 per cent. ammonia solution goes into reaction with gypsum and carbon dioxide for production of ammonia sulphate and calcium carbonate. Part of the latter is prepared as a counterreagent for acid soil fertilizing; part is assigned to the Leunawerke's nitric-acid plant for processing to calcium nitrate, while the rest is dumped as waste in a spacious declivity adjoining the works.

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Sulfur exports from the United States showed a gain of 83,300 in tonnage and $1,426,751 in value during the first eight months of this year as compared with the similar period of last year. Increased purchases by Canada and New Zealand of 13,800 tons each and France of 10,000, added to enlarged consignments to Germany, amounting to 26,500 tons accounted for the gain.

# Plant Safety Organization

By G. H. Miller*
*Safety and Fire Protection Division*
*E. I. du Pont de Nemours & Co.*

THE "Plant Safety Organization" is an old subject, and the form of organization best fitted to carry on accident prevention work efficiently is, of course, still being debated. We know that there are a great many different forms of safety organizations in practice to-day, and no doubt they all have some merit. We know also that many of the safety organizations attempting to conduct safety work have faults, some of which are common to all. Perhaps the most common fault is the fault of being incomplete.

However, this discussion is not prepared with the idea of debating the relative merits of the different forms of safety organizations in use, but rather to outline what, after some experience and study, appears to be the logical one. Plants vary so much in size, products, personnel and other characteristics that to arrange a form to fit all equally well, even allowing alterations, might at first seem impossible, but it is not as difficult as it appears.

To organize, means to arrange or distribute into parts with the proper people so as to work or carry out a scheme efficiently. An organization is a group of individuals properly and systematically united for some end or work. A group of men attempting to carry on safety work in a plant is not a safety organization in the true sense, unless those men are the proper individuals and unless they are logically and systematically united for such work. It appears that the proper plant safety organization is answered by two questions: Who of the plant personnel are the proper individuals to conduct safety work, and how are they to be systematically united for the purpose ?

### The Operating Organization is the Safety Organization

Theoretically, every employee of a plant is a proper person to be in the safety organization and should be, and all of the employees of the plant should be united for safety work just as they are united for operating work. The operating organization is the safety organization, and each employee has his responsibilities to assume, his burdens to bear and his duties to perform in the same sphere in safety work that he has in operating work. The plant manager, his assistant, the department heads, the foremen all have their respective responsibilities and fields; and finally the individual workman has his little area of endeavor and his responsibilities regardless of how small they may be. To whatever extent each man on the plant is responsible for operations, to that same extent he is also responsible for the safety of such operations; and his responsibility should not be taken from him nor should it be minimized.

### Each Employee in Safety Work

The fact that each employee of the plant has his logical place in safety work is so obvious that it is strange that we see it given to him so infrequently. One is more likely to see the safety engineer taking the place of the plant manager or a workman taking the part of a foreman in the safety organization. Generally, the result is that those individuals who are trying to carry on the accident prevention program may not be competent to cover the fields in which they are working and may have little or no authority to carry out their ideas. In the earlier days of accident prevention on plants, a safety committee of four or five men, selected without much regard to the respective positions and fields of authority of its members, bore the entire burden of the safety program. This small inefficient committee was the safety organization. Such a committee still is in many plants.

The burden of accident prevention should be properly distributed over the personnel of the plant, giving each one his logical part with the whole systematically united. The manager is responsible for the safety of the employees in his plant, just as he is responsible for all the other phases of the plant activity. When a

**Presented before the Chemical Section National Safety Council.*

member of the plant staff, whether he be called a general foreman, a supervisor, or a department superintendent, is given the job of operating a department the safety of the employees of that department goes with it. A foreman is responsible for the safety of the employees he supervises to the same extent that he is responsible for any other factors of their employment on the plant. The individual workman, in accepting his job, assumes a certain responsibility for carrying it on safely. When these bodies of men are systematically united in safety work just as they are united in operating work, the result is a safety organization with ability to accomplish its purpose. The safety organization is the operating organization.

### Divisions of The Safety Organization

The safety organization, however, is much too large to work as one unit and must therefore be divided, but it should be divided logically. The divisions of the safety organization are generally called safety committees, and the problem of the proper form of plant safety organization is largely one of arranging these committees so that they include the plant personnel, fit the operating oprganization, and allow the burden of the work to be properly distributed.

The arrangement of safety committees with authority or jurisdiction more or less in line with the operating positions of the members is to some extent carried out on plants to-day; but one will probably be safe in saying that in most cases the arrangements of safety committees has not been extended to include the workmen, or if it has the workmen have been included in place of the logical members.

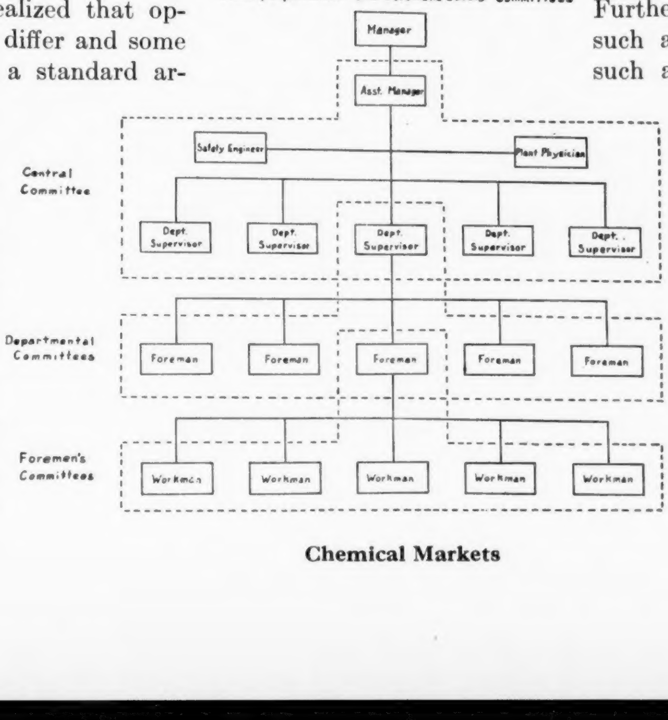
The accompanying diagram of a safety organization showing the arrangement of committees is prepared for a plant of such size, but may be expanded for a larger one or contracted for a smaller one. For instance, a very large plant might be divided into separate units with an organization, similar to that shown for the medium-sized plant, for each unit. The safety organization of a small plant might be composed of the organization beginning with the departmental committee. Furthermore, it is realized that operating organizations differ and some minor alterations in a standard arrangement of committees might be necessary.

The personnel of a medium-sized plant usually includes the following: a manager, an assistant manager, four or five department superintendents, foremen, workmen, a safety engineer who may have other service duties such as employment, welfare, etc., and a plant physician who may be on part or full time. There are, of course, office employees also. The safety organization on a plant of this size and personnel can be divided into three forms of safety committee bodies, a staff committee or central safety committee, departmental committees, and foremen's committees, the central committee to direct the safety work, the departmental committees to extend the work to the foremen and the foremen's committees to carry it to the workmen.

While this paper is primarily interested in the safety organization as an organization, yet it may be necessary in discussing the personnel of the various safety committees to mention some of the committee functions to show how the committees are related to each other.

Plant Safety Organization

Central, Departmental and Foremen's Safety Committees




### Central Safety Committee

The central or governing safety committee of the plant should be composed of those men of the staff who are responsible for plant operations together with the safety engineer and the works physician. It is generally the practice to have the assistant manager the chairman of this committee and the safety engineer the secretary. In most cases the former can give the management's decision on problems, and the secretary is usually responsible for keeping certain accident records and other data which he may present to the committee.

We have purposely not discussed the part that the safety engineer takes in the safety organization up to this time, because it was desired to include this subject under one section. While in some plants the safety engineer is almost entirely responsible for carrying on the safety work, yet the best practice appears to be for him to act largely in an advisory capacity, except that he may have certain specific duties to perform. He should keep posted on the development of new safety devices and safety activities. He should be the one to make searching analyses of accident records and detailed studies of special problems and hazards. Furthermore, many safety devices such as gas masks, and equipment such as elevators require periodical attention of a more or less technical nature, and these as well as numerous other duties are those of the safety engineer. It appears that the safety engineer is theoretically the guider, the advisor, and the feeder of the safety organization. While the diagram does not show the safety engineer on any of the committees except the central committee, yet it is to be understood that he is a mem-

ber of all of them and that his service to each is similar to the service he renders the central committee.

The works physician is made a member of the central safety committee of the safety organization because of the need of his technical knowledge in the solution of health problems.

### Departmental Safety Committees

Each department should have a departmental safety committee composed of the department head as chairman and the foremen as members. If it is not advisable to have all the foremen members of these committees at one time, the membership should be rotated so that all foremen will eventually have an opportunity to serve on them. Each departmental safety committee should act on all problems of safety within the department, taking care of them insofar as it has the authority to do so and referring to the central committee those problems which the departmental committee is not able or not in authority to solve as well as those problems which have plant application.

It will be seen that in the arrangement being discussed, the departmental safety committees are tied to the central safety committee through the department heads who are the chairmen of the former and members of the latter.

### Foremen's Safety Committees

Each foreman should have a safety committee composed of his workmen with himself as chairman. Here again, if it is not practicable to include all the workmen who are under the foreman on his committee at one time, the membership should be rotated so that all the workmen may eventually be allowed to serve on this committee and take an active part in the direction of the safety of the area in which they are employed. Furthermore, here again the committees act within their jurisdiction. They take care of the problems of safety within their operating fields which they have the ability and authority to solve, referring to the departmental safety committees and perhaps through these to the central safety committee, problems which they do not have the ability to solve or do not have the authority to handle, as well as problems which have application departmentally or to the plant as a whole.

It is not the plan to have the foremen's committees hold meetings of great length. As a rule, only a few minutes may be required for the meetings of these bodies; and it may not be necessary to keep minutes of the meetings, although it is entirely practicable to have the foreman take notes of the problems which they are unable to solve and submit them to the committee of next higher authority. It will be seen that the foremen's committees are tied to the departmental committees by virtue of the fact that the foremen are members of them.

The frequency of the committee meetings may be influenced by a great many plant conditions, but it is generally good practice to have the foremen's committees meet weekly, the departmental committees semi-monthly and the central committee at least monthly.

Each committee should have an inspection force, the foreman's committee inspectors inspecting the area under the jurisdiction of the foreman, being checked in these inspections by the departmental committee. Each departmental committee should have inspections of the department by departmental committee inspectors, being checked in such inspections by the central safety committee. Finally, the central safety committee should make inspections of the the plant as a whole through inspector members.

The study of major injuries should follow the channels of the safety organization. A major injury, which occurs within the group of men under a foreman, should be investigated and recurrence prevention considered first by the foreman's committee, the injury investigation then being passed on to the departmental committee for checking and for whatever application the circumstances may have departmentally. Finally, the injury should be considered by the central committee for the purpose of checking the investigation and for whatever circumstances there may be concerning it which apply to the plant as a whole.

Safety incentives should no doubt be handled in reversed order. By incentives we refer to the inspirational safety activities. These will generally originate with the central safety committee and be passed down to the workmen through the natural channel of the branching safety bodies.

### Distributing the Safety Work

If the arrangement of safety committees as outlined is carried out on the plant, the safety organization will approximate the operating organization, bringing each employee into the field of accident prevention work in his proper place.

No one on the plant except the manager can successfully take the place of the manager in the safety program. No one can take the place of the departmental superintendent except the superintendent himself. There is no one but the foreman who can take the logical place of the foreman in the safety organization. Finally, there is no one who can take the place of the individual workman in his small field of safety work except the workman himself. The safety engineer has his logical place, and the plant physician has his.

There is no greater incentive to interest one in any work than the incentive secured by giving one his logical place in it.

Whether or not accidents are increasing or are decreasing throughout industry generally is being debated. There seems to be some justification for the statement that at present the trend of accidents is

upward in spite of the fact that safety work is perhaps being carried on more energetically to-day than ever before. It seems that, considering the multiplying problems of accident prevention, it becomes increasingly difficult to maintain our control of them. However, we know that to-day, as in the past, the majority of major injuries occur as the result of carelessness, thoughtlessness, or negligence on the part of the workman, possibly to a large extent due to insufficient instruction and supervision and in some cases to lack of managerial support of safety work. Unquestionably, satisfactory reduction in accident rates must come about through a better organization of plant safety—through arrangements whereby all employes, including the individual workman, are encouraged to take a greater part and consequently a greater interest in safety.

## E. I. du Pont de Nemours Announces $25,000,000 Building Projects

E. I. du Pont de Nemours & Co., Inc., announces plans to spend more than $25,000,000 on building projects in the next twelve months. Of this amount, $16,000,000 will go to complete projects already under way, including rayon plants in the South, a cellophane plant at Old Hickory, Tenn., a plant for the viscoloid company at Leominister, Mass. and expansions at Belle, W. Va., for the Du Pont Ammonia Corp.

Construction under way at the dye works at Deepwater, N. J. will involve a further expenditure of about $2,500,000, and $4,000,000 is to be spent for expansion and improvement of Grasselli Chemical Co. plants throughout the country, with the largest expenditure, $1,500,000, at Grasselli, N. J.

The Du Pont fabrics and finish company which has under way a new varnish plant in Philadelphia, will spend about $2,250,000 at Newburgh, N. Y., Fairfield, Conn., and Parlin, N. J. An addition to the office building will cost $2,000,000.

## *New Incorporations*

A. Bertola & Co., Inc., Wilmington, Del., medicines, chemicals—Colonial Charter Co., 500,000 shs.

Forhan Co., chemicals—Dawes, Abbott & Littlefield, 120 Broadway, N. Y. City, 100,000 shs.

Carbon Dioxide and Chemical Co., Wilmington, Del., dioxide ice—Corporation Service Co., Wilmington, Del. 300,000 shs.

Hatsdale Research Labs., White Plains, cleansing preparations—Frank Weit & Strouse, 185 Madison Ave., Manhattan, $50,000 pf, 90 shs com.

Grand Rapids Mfg. Corp., chemicals—Rubinton, Coleman & Gribetz, 32 Court St., 20,000 shs.

Consolidate Chromium Corp., New York City, chromium, gold, silver,—Corporation Trust Company of America, $12,500,000, 1,500,000 shs com.

Zoric Products Co., Wilmington, Del., carbon, minerals—Corporation Trust Company of America, 2,500 shs. com.

Belvidere Industrial Alcohol Corp., denatured alcohol—H. C. Pollack, 1 Madison Ave., New York City, 500 shs com.

Obex Corp., chemicals—Katz & Levy, 38 Park Row, New York City, 100 shs com.

The Dicalite Co., Dover, Del., gypsum, lime, cement—U. S. Corp. Co., 10,000 shs com.

Arklahoma Co., Inc., Wilmington, chemicals, medicines—Corp. Trust Co. of America 50,000 shs com.

Doubler Chemical Co., Newark—Phillip Lowitz, Newark, 1,000 shs com.

Tyro Engineering & Chemical Co.—J. M. Brooks, 527 48th St. Brooklyn, 600 shs com.

Heinrich Chemical Co., Wilmington, toilet articles—Corp. Service Co. 2,000 shs com.

Nitrogen Industries, Ltd., Toronto, is chartered in Canada to manufacture and sell nitrogen products and machinery used in production of such products. Capital stock consists of 100 shares, par $100.

## *New Plant Construction*

Shell Chemical Co., purchases 135 acres near Long Beach for the nucleus of a $5,000,000 nitrogen fixation plant. Site was purchased at price reported as $150,000. An option also was taken on 265 adjoining acres, which will bring land investment to slightly more than $400,000. The land lies near Los Alamitos, between Anheim and Long Beach. Construction is expected to start shortly on the first plant unit which will cost $250,000. Additional units will follow as fast as conditions warrant.

Monarch Chemical Co. plans construction of new plant at Carteret, N. J., adjoining the works of the Warner Chemical Co., with which the former is affiliated. New building will be one-story, cost about $40,000, and be used primarily as mixing and packing plant for baking powders and similar products for which raw materials are furnished by the Warner Chemical Co. The latter is also to start the erection of a new building at Carteret to be equipped as a laboratory, and cost over $25,000.

By-Product Fuel Co., Boston, plans erection of two plants for low temperature carbonization of coal in Cambridge, Mass., and Rockland, Me. Company is licensed by Fuel Engineering Co., Boston, to use patents covering low temperature carbonization processes similar to those used in Scottish iron industry. It plans production and sale of ammonium sulfate, phenol, cresols, tar oils, road tars, fuel gas and pig iron.

Sugar By-Products Corp., New Orleans, plans erection of new plant consisting of alcohol distillery, with by-products plant for manufacture of fusel oil, acids, potash and kindred products. The works will consist of several buildings reported to cost about $400,000 with equipment.

Waukegan Chemical Co., Waukegan, Ill., plans erection of new two-story factory building and reorganization of present buildings and equipment, at estimated cost of $85,000. New plant is expected to be in operation by February 1.

Procter & Gamble Co. plans construction of $1,000,000 plant in Memphis for sheeting chemical cotton. The work had been done by outside companies. The product will be sold to concerns producing rayon.

Chemicals & Drugs, Inc., holding company with offices in New York and Boston, plans to establish a laboratory and warehouse in Baltimore, having leased a five-story building for that purpose.

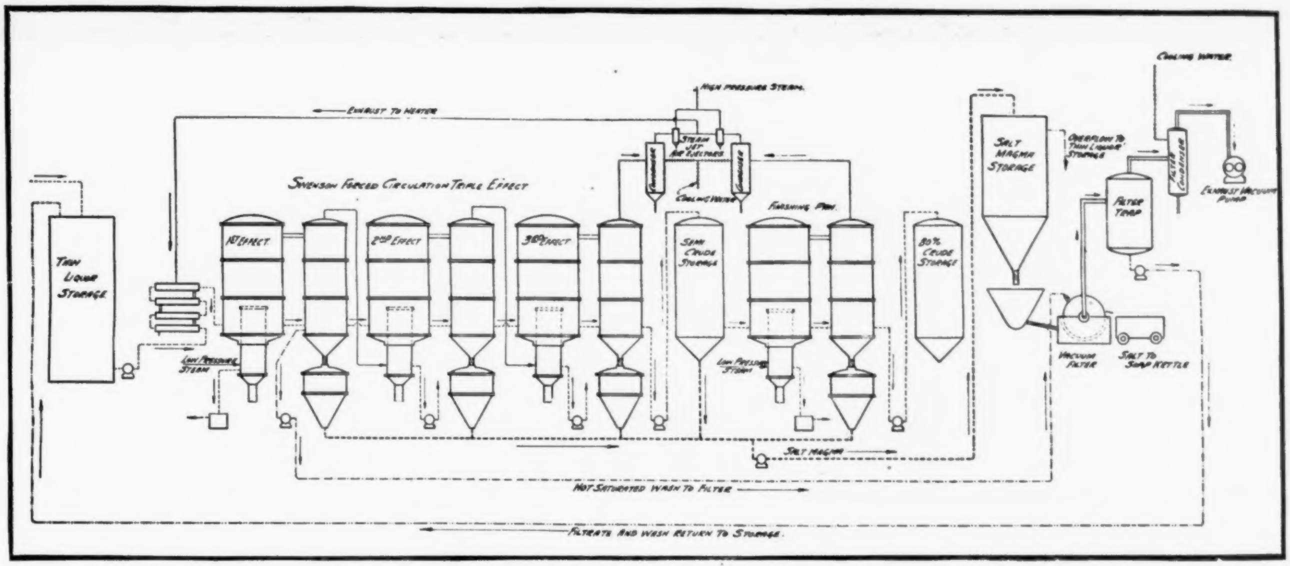
Construction of a new plant to utilize the waste and by-products of the Great Western Electro Chemical Co., Pittsburgh, Cal., is started. Plant is to cost over $250,000.

Baugh Chemical Co., Baltimore, fertilizers, plans construction of new plant, consisting of a one-and two-story unit, to cost about $90,000 including equipment.

Celanese Corp. begins construction of multi-story unit addition to its Cumberland, Md., plant, reported to cost over $500,000 with machinery.

Philadelphia Quartz Co. begins construction of branch plant in Baltimore.

Corning Glass Co. plans erection of $600,000 plant addition.




*Flow chart for a forced circulation, triple-effect evaporator used in the manufacture of glycerine.*

# EVAPORATION—

# *in Chemical Manufacture*


By L. C. Cooley

*Chemical Engineer, Swenson Evaporator Co.*


Evaporation is the term commonly applied to the removal of water from solutions of sugar, salt and similar materials. Your syrup for waffles, sugar for coffee and salt for eggs are also made by the process of evaporation. Evaporation is important in soap-making and in manufacturing glycerine used in explosives and as an anti-freeze.

Evaporation is accomplished by the application of heat in the form of fire or steam except in a few special cases. In any case fuel is required, and the cost of evaporation is determined by the amount of evaporation obtainable from a ton of coal in the form of fire or steam.

### Multiple Effect Evaporation

In boiling or evaporating maple syrup or in certain salt operations where direct fire is used, the cost of evaporating a ton of water is greater than that for evaporating a ton of water in an ordinarily efficient boiler; therefore, it is cheaper to evaporate by using steam. To reduce the cost of evaporation by steam, a method has been developed known as multiple effect evaporation by which the steam introduced into the heating tubes of an evaporator produces vapor which, instead of going off into the air or to a condenser, is fed to the heating tubes of a second evaporator from which vapor will go to heat a third and so on to a fourth or fifth evaporator. The more evaporators there are in series, the less steam there will be used.

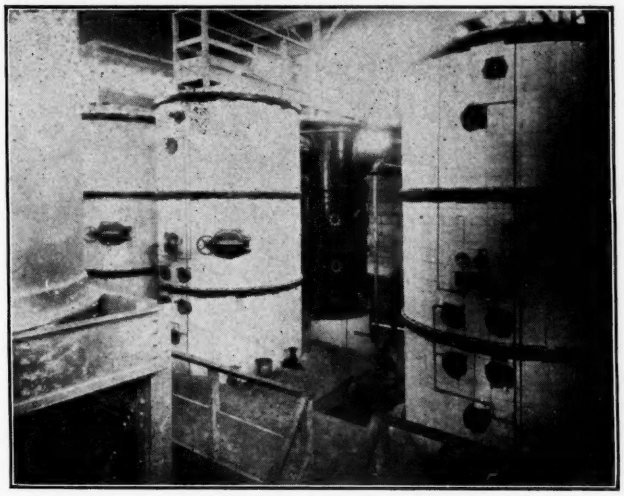
Space does not permit a full discussion of the limitations of the number of times that the vapor from one evaporator can be used to heat the succeeding evaporator, except that the investment increases with the increase in evaporators, and the physical and chemical properties of a solution also affect the number. For making distilled water, the number can be as many as ten, but for caustic soda, the limit is nearer four or five.

### Modifications in Number

The limitations imposed on the number of evaporators which can be arranged in series by the physical properties of the materials being handled, can be modified by methods of design and construction. For example, if a solution of caustic and salt is being evaporated in an evaporator with horizontal tubes and is at a stage in the concentration where the solution is viscous and circulates slowly, then the transfer of the solution to an evaporator with vertical tubes would cause the circulation to be increased.

The increase would be due to the coffee percolator effect of bubbles of vapor interspersed with slugs of liquid spouting vigorously in the confined path of the vertical tubes.

While for this purpose vertical tubes are better than horizontal, difficulties are introduced by the depositing



*These are pictures of an evaporator installation in the plant of Westvaco Chlorine Products Co. The two bodies covered with asbestos blocks on the left are the first and second effects of the double effect evaporator, each being connected to a salt settling chamber shown in black in the rear. The right hand evaporator is a single effect for carrying the concentration to 50 per cent NaOH.*

of salt on the tubes when evaporation takes place within the tube itself. This condition has called for another improvement in design, namely, the forcing of the liquid through the tubes sufficiently rapidly to prevent boiling or vaporizing until the liquid has escaped from the tube ends where a portion flashes into vapor. In general, if no vaporizing takes place in the tubes, no salt forms on the tubes.

To cite an example, in the electrolytic caustic soda industry, it has been customary to use cast iron double effect evaporators with steel heating surfaces. These double effect evaporators, as the name implies, use steam in one effect or body to cause evaporation, and the vapor given off by one effect causes evaporation to take place in the second effect. In other words, the steam is "used twice" or nearly so. There are certain technical limitations to the number of times the steam can be re-used. The more times, the lower the fuel cost. Therefore, if a third effect could be used, there would be nearly a 50 per cent increase in the amount of evaporation per pound of steam.

By a new design and method of operation, a third body can be used with a consequent reduction in the coal consumption.

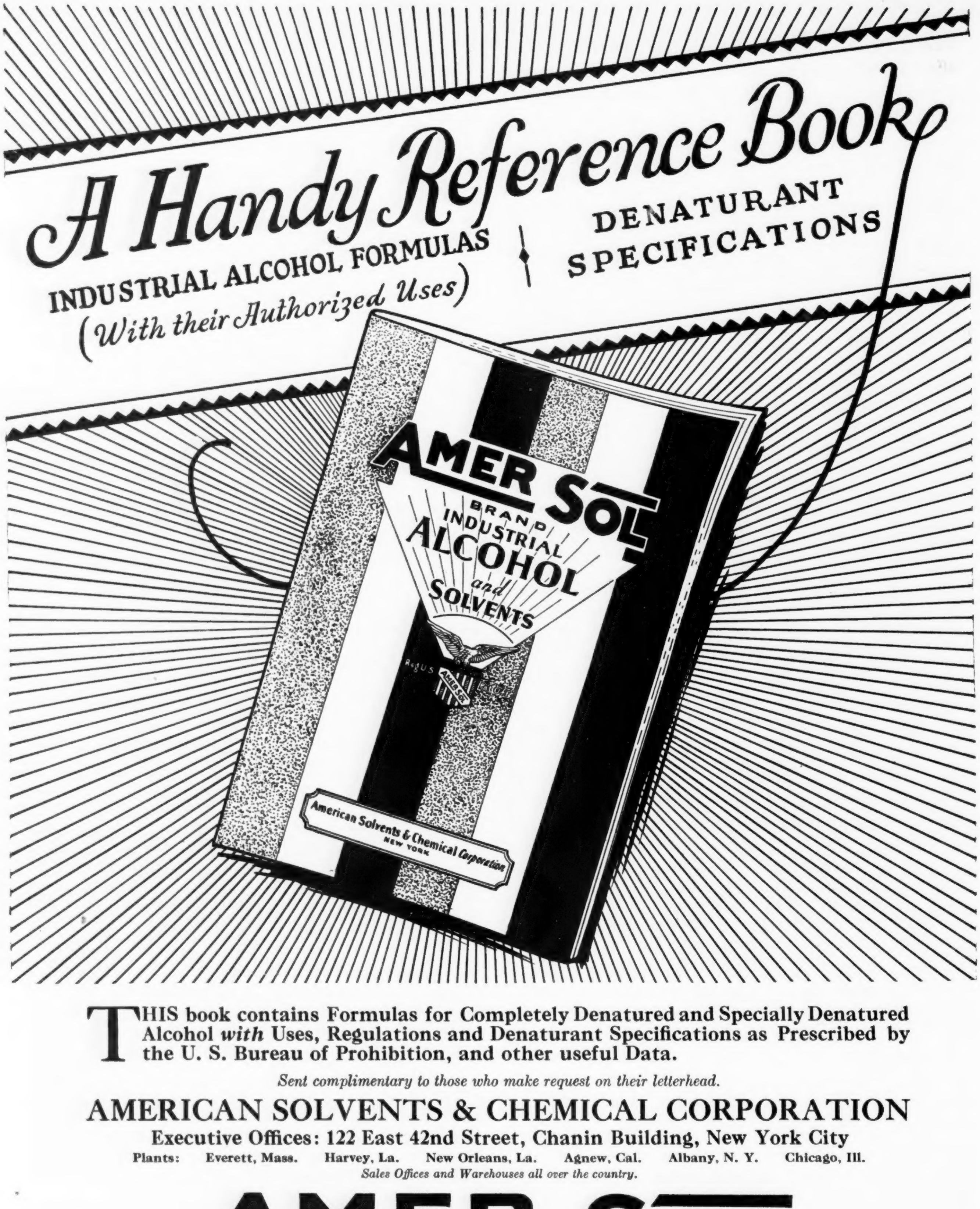
Dilute caustic soda solution containing dissolved salt is accumulated in storage as received from the electrolytic cells. From storage the cell liquor is pumped continuously (Note the feature of continuity), to the first effect of a triple effect evaporator, where it is circulated through nickel heating tubes surrounded by steam at about thirty-five pounds pressure. During the circulation, water evaporates from the boiling liquid, giving off vapor at a back pressure of about two pounds, while salt precipitates and is settled out. The vapor at two pounds pressure, passes to the space around the heating tubes of the second effect, where more vapor is given off, say at twelve inches vacuum and more salt is thrown out. In the third body, the heating tubes using vapor around them at twelve inches of vacuum, give off vapor at twenty-seven inches of vacuum, which passes to a condenser. More salt is removed from the third effect and the solution which started with a content of ten per cent caustic and fourteen per cent salt, rises through twelve per cent caustic in the first body to eighteen per cent in the second body and twenty-seven per cent in the third body. At twenty-seven per cent caustic soda, nearly two-thirds of the original content of water have been removed with the economy which accompanies triple effect evaporation.

In a large plant producing in the neighborhood of sixty tons per day, the twenty-seven per cent caustic solution is next evaporated to forty per cent in a double effect of the new design. The concentration is then finished in a single effect evaporator built with a nickel clad steel heating element, strong enough to withstand one hundred fifty pounds pressure, which affords a working temperature drop great enough to rapidly produce a concentration of fifty per cent, or even as great as seventy-five per cent caustic soda.

Beyond the seventy-five per cent stage, it is customary to finish evaporating in open pots made of a

*This shows the pumps for the same installation—a dry vacuum pump in the left background and three Kingsford centrifugal pumps in the center and right background. These latter are the circulating pumps which force the liquid through the heating tubes.*

special grade of cast iron, using coal or gas as fuel. Introducing the solution with as little water as twenty-five per cent, instead of the usual forty or fifty per cent, greatly reduces the time required in the pots, hence the corrosive effect per ton of product is very greatly


A Handy Reference Book
INDUSTRIAL ALCOHOL FORMULAS
(With their Authorized Uses)
DENATURANT SPECIFICATIONS
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reduced, likewise the amount of fuel necessary to heat and to evaporate the charge.

Another way of looking at it shows that a greatly increased tonnage of solid caustic can be put through a given number of pots by reason of the space available which formerly was occupied by water. The time and fuel consumed in heating and evaporating the excess water also represents a great saving.

### Evaporation of Glycerine

The low price now being obtained for glycerine makes economy in production of special interest. Technical limitations, which until recently, restricted to double effects the evaporation of electrolytic caustic soda, also have been restricting the evaporation of glycerine solutions which are obtained as a by-product of the production of soap. Furthermore, there is more evaporation necessary on account of the lower percentage of glycerine available in present day soap lyes derived from fats of widely varying properties and purity.

In a typical report on evaporator efficiency in the manufacture of glycerine it was pointed out that the savings indicated would have been very much greater if the percentage of glycerine had been as low as is frequently obtained. A mixture containing 9½ per cent glycerine and 15 per cent salt is sent to a double effect evaporator from which is produced a solution containing 12 per cent glycerine and 19 per cent sait at a cost of .84 of steam per pound of water evaporated and 6.8 gallons of 85° Fahr. condensing water per pound of glycerine.

The next step in the evaporation is to concentrate to 30 per cent glycerine and 16 per cent salt in a single effect evaporator at a steam cost of 1.14 of steam per pound of water evaporated and a condenser water consumption of 19.7 gallons of 85° water, per pound of glycerine.

In a third and final step, the glycerine is concentrated to 80 per cent with 8.5 per cent salt present in a single effect evaporator at a steam cost of 1.2 of steam per pound of water evaporated and a condensing water cost of 8¼ gallons of 85° Fahr. water per pound of glycerine.

### Steam Consumed

For a million pounds of glycerine or a million and a quarter pounds of 80 per cent glycerine, the amount of steam required will be 8,324,000, the evaporation will be 7,781,000 and the condenser water required will be 34,804,000 gallons.

In the previous description, only one double effect evaporator has been used. In other words, very little "re-use" of steam has been made. With an improved design, the evaporation can be carried out between 9 per cent glycerine and 50 per cent glycerine in triple effect evaporator, which means that over 92 per cent of the total evaporation can be carried out with the economy obtainable in triple effect evaporation. The final concentration up to 80 per cent is then carried out in a single effect, which is necessary due to certain technical limitations. Under these last conditions of operation, the total steam used per million pounds of glycerine is 4,364,000 pounds, the evaporation is 7,781,000 pounds, the condenser water required is 15,730,000 gallons at 85° Fahr. water. Power consumed will be 34,560 kilowatt hours.

The changes in evaporator construction outlined in the foregoing indicates the need for consulting evaporator manufacturers or specialists, but at the same time the prospective purchaser must not overlook the fact that the design and improvements in design are based on the laws of physics so that the engineers of a purchaser's staff should be required to keep in touch with technical literature in order to better understand the information which they will receive from the sales engineers of an equipment maker.

## *Freight Rate Decisions*

New York Public Service Commission approves a reduced freight rate of 15.5 cents a hundredweight for the New York Central (East) on liquid calcium chloride in packages, carload, minimum weight 50,000 pounds, and in tankcars, carload, from Solvay and Syracuse to stations on the New York, Ontario, and Western; Cadosia, Keerys to Walton; and Northville to Sidney, inclusive, a reduction of 3.5 cents a hundredweight. It is effective December 9.

Commission also approves a new schedule of reduced freight rates filed by W. S. Curlett, agent for various carriers in Trunk Line territory, providing that benzene in metal cans in boxes, in bulk in barrels, or in tank-cars, carload, to New York State stations west of Buffalo and Salamanca, providing that, from stations taking the Albany rate, the basis shall be 25.5 cents a hundredweight; from stations taking the New York rate, 31 cents a hundredweight; and from stations taking the Syracuse rate, 25 cents a hundredweight. They are effective December 15.

Manufacture of fermentation citric acid is being started up by the Prager Montan und Industrialwerke vorm. Joh. Dav. Starck, Germany. The process to be used is based on German Patents No. 434,729 in the name of Dr. Benno Bleyer, and No. 461,356 in the name of Montan und Industrialwerke. The fermentation of the molasses is carried out in shallow open vessels making use of selected strains of citronyces mucor, aspergillus, etc. The temperature is kept low, and it is stated that under the operating conditions the danger of infection during prolonged fermentation, and also of the production of oxalic acid, is avoided. When the fermenting liquor has attained its maximum concentration of citric acid the latter is precipitated with lime or barium compounds, and worked up into citric acid in the usual manner.

I. G. Farbenindustrie, announces that the satisfactory development of the I. G.'s business that marked the year's second quarter continued during the third. Business in coal tar dyes and intermediates showed a favorable tendency, exports were lively and have been improved in a part of European markets.

Business in chemicals and solvents, as well as pharmaceuticals, is satisfactory, while exports have increased. The I. G.'s dyestuffs output is estimated to be 75,000 metric tons annually, with a production value of 350,000,000 marks approximately $83,300,000, according to the Department of Commerce.

## Coal Tar Dye Exports Increase Over Last Year

Exports of coal-tar dyes, colors and stains, other than dyes for household use, during the first eight months of this year were valued at $4,913,647, representing an increase of $1,070,488 over the corresponding period of 1928, when the shipments of dyes reached a value of $3,943,159, according to the Department of Commerce.

The largest purchaser for the period was China, with total imports of American dyes aggregating $2,377,364 as compared with $1,453,032 for the same period last year. Japan was the second largest purchaser, although exports to this country declined from $767,156 in the first eight months of 1928, to $718,221 for the corresponding period this year, it is shown.

Exports of dyes to Germany in the first eight months of 1928 totaled $49,249, growing to $151,216 for the same period this year. Although this does not necessarily mean that the United States is displacing Germany in the dye industry, it nevertheless indicates a change in the trend, it was stated at the division.

The Philippine Islands purchased $51,639 worth of dyes during the initial eight months this year, which compares with $24,045 for the same period in 1928. Exports to Argentina also increased from $52,863 in 1928 to $96,633 in 1929, the figures reveal.

The value of dyes purchased during the first eight months of this year by other large importers from the United States was as follows: Canada, $623,345; India, $422,871; and Belgium, $152,295.

While exports of dyes from the United States are increasing, imports of coal-tar products are showing a slight decline. During the first nine months of 1929, the value of these products imported into the United States was $17,157,495, which compares with $17,930,427 for the corresponding period in 1928. According to the division, the United States still imports a considerable quantity of dyes from Germany.

# Chemical Facts and Figures

## Standard-I. G. Co. Formed to Merge Hydrogenation Patent Interests

**Formation of this Holding Company Marks Completion of Negotiations Between Standard Oil of N. J. and German I. G.—Majority Stock Owned by American Company which also Assumes Responsibility for Management—Technical Work in United States in Hands of Standard Oil Development Company—Plan to License Process to Entire Oil Industry.**

Standard-I. G. Co., owned jointly by the Standard Oil Co. of New Jersey and the I. G. Farbenindustrie, is formed to take over control of the merged patent interests of the two companies with respect to the manufacture of petroleum products by the hydrogenation process. Majority stock of the company will be owned by Standard of New Jersey, which will also assume responsibility for its management.

Technical work in the United States on development of the process and construction of plants will remain for the present in the hands of Standard Oil Development Co., which will co-operate directly with the technical staff of the I. G. All business aspects of the joint development will be centered in the Standard-I. G. Co.

F. A. Howard, now head of the Standard Oil Development Co., will be president of the new corporation; E. M. Clark, vice president, M. H. Eames secretary and R. P. Resor, treasurer. Directors will include E. M. Clark, Walter Duisberg, R. T. Haslam, F. A. Howard, Peter Hurll, H. A. Riedemann, H. G. Seidel, S. A. Straw, Otto von Schrenk and Guy Wellman.

In respect to the hydrogenation process as supplementing refining and conversion by decomposition, the company states:

"The hydrogenation method enlarges the field of possible conversion of petroleum products as distinguished from refining of such products in what are perhaps the only three statistically important respects in which such enlargement is required—as to quantity of available supply; second, as to balance between light and heavy fuel products, and third, to an important extent at least as to the reduction of sulfur content and improvement of other chemical characteristics, the difficulty of control of which by refining methods has been a minor but important weakness of the industry.

"Three initial commercial oil plants for the operation of the hydrogenation process, now building at Bayway, N. J., Baton Rouge, La., and Baytown, Texas, are proceeding rapidly toward completion and these plants, together with the I. G. commercial plant at Merseburg, Germany, which operates both on coal and oil, will provide a fairly wide range of commercial experience. Aside from the basic technical and economic questions which are involved in the development of the hydrogenation method, the business aspects of the commercial use of the process have received the most careful consideration.

"It has never been the plan to restrict the use of the process to the subsidiary and affiliated units of Standard Oil Co. (N. J.). The views of the I. G. Farbenindustrie A. G., and the Standard Oil Co. (N. J.) are and have been that the process will have the best chance of exerting a maximum constructive influence on the oil industry if it is offered for license in the United States at the earliest practicable time and on a basis which will provide opportunity for co-operation of the industry at large in its further development."

## Newport Company Acquires Majority Control of Acetol Products, Inc.

Newport Co., South Milwaukee, Wis., acquires 70 per cent of the common stock of Acetol Products, Inc., New York, manufacturer of a synthetic glass which admits the violet rays of sunlight. S. J. Spitz and Dr. E. H. Killheffer, directors of the Newport Co., have been elected directors of the acquired company.

Acetol Products, Inc., whose plant is in New Brunswick, N. J., was incorporated in New York in 1927 to acquire the business and assets of a New York corporation of the same name. Its product, "Cel-O-Glass," is distributed through dealers, wholesalers, and mail-order houses through the United States. Its authorized capital stock consists of 240,000 shares of common stock of no par value, and 60,000 shares of convertible, class A preferred stock.

Newport Co. has extensive interests in synthetic organic dyes and chemicals, textile chemicals, naval stores, and wood-fiber insulating material. Its plans contemplate expansion in various divisions of the chemical and related industries. Newport Chemical Works, Passaic, N. J., is its major subsidiary in the organic chemical field.

## Du Pont Ammonia Corp. Plans To Triple Output of Belle Plant

Du Pont Ammonia Corp. plans to triple output of Belle, W. Va., plant, the present capacity of which is 2,000,000 gallons of methanol and other alcohols and solvents annually. Entire methanol production in America at present is not placed above 5,000,000 gallons annually. The Belle plant employs the Casale process for both methanol and ammonia production as well as a modification of the Claude process. Ammonia production, now over 100 tons daily, will be more than doubled early in 1930 according to present plans for additional equipment. Present capacity of the ammonia department is 145 tons daily and an increase to 215 tons has already been authorized.

The present executive personnel of the plant is as follows: production superintendent, Dr. R. M. Evans; maintenance engineer, H. E. Walcott; assistant production superintendent, Prescott Van Horn; Alcohol superintendent, Dr. Howard Hoenshel; ammonia superintendent, F. D. Snyder; and hydrogen superintendent, Hugh Holstein.

Rayon and Synthetic Yarn Association is formed by fourteen rayon producers as follows: American Viscose Co. (Courtaulds), Du Pont Rayon Co., Industrial Rayon Corp. Tubize Co., American Glanzstoff Corp. American Bemberg Corp., American Enka Corp., Acme Rayon Corp., American Chatillon Corp., Belamose Corp., Delaware Rayon Co., New Bedford Rayon Co., A. M. Johnson Rayon Mills, and Skenandoa Rayon Corp. The only conspicuous absentee in this list is the American Celanese Co. The association will supplement the work at present being done by the Rayon Institute.

Salesmen's Association, American Chemical Industry, makes plans for annual Christmas party to be held in the Hotel McAlpin, New York, December 27. The committee in charge consists of chairman, Grant A. Dorland, MacNair-Dorland Co.; Robert Wilson, Dow Chemical Co.; R. T. Grant, Noil Chemical & Color Works; William H. Adkins, Givaudan-Delawanna, Inc.; Robert Quinn, Mathieson Alkali Works; and H. B. Prior, H. B. Prior & Co.


*The Wright Biplane, which established the world's sustained flight records, 1909.*

*Over 20 Years Ago EBG Pioneered in the manufacture of Liquid Chlorine*

*The first pound of Liquid Chlorine produced in the U. S. A., 1907*

FRANCE, on the New Year's Eve of 1909. Wilbur Wright, American, launches his biplane into the air for the longest sustained flight in history—two hours and thirty minutes. The world is astounded at the establishment of this pioneer aviation record.

The EBG plant at Niagara Falls, the same year. Liquid Chlorine in the making. And another achievement is registered, the benefits of which are shared today by many industries.

Like the pioneers in aviation, EBG has continually gone forward, working and experimenting toward still greater accomplishment . . . and, displaying the true pioneer spirit, EBG is always ready to apply its knowledge and experience to the greater efficiency of bleaching processes.

EBG

# Liquid Chlorine

## Electro Bleaching Gas Co.

PIONEER MANUFACTURERS of LIQUID CHLORINE

**PLANT:**
**Niagara Falls, N.Y.**

**MAIN OFFICE:**
**9 East 41st Street**
**New York**

## *Personal and Personnel*

Prof. James F. Morris and Prof. F. G. Keyes, Massachusetts Institute of Technology; Prof. L. G. Newell, Boston University; Prof. Arthur B. Lamb, Harvard University; Dr. Willis R. Whitney, General Electric Co.; Dr. C. E. K. Mees, Eastman Kodak Co.; Prof. Marston T. Bogart, Columbia University; Prof. Roger Adams, University of Illinois; Dr. C. M. A. Stine, E. I. du Pont de Nemours & Co., Inc.; James A. Rafferty, president, Carbide & Carbons Chemicals Corp.; and Dr. Irving Langmuir, president, American Chemical Society, are asked by Arthur D. Little to serve on a committee to outline plans for presenting a hundred years' progress in chemistry at the Chicago Century of Progress celebration in 1933. This committee is one of forty similar groups appointed by members of the National Research Council's science advisory committee to collaborate with the Century of Progress trustees in developing a basic theme whereby the Chicago exposition may be able to dramatize for visitors to the fair the advances which have been made in pure and applied science during the past hundred years.

Glenn M. Davidson, National Biscuit Co.; Frank H. Gardner, Cornstalk Products Co.; Harry Mix Hooker, Hooker Electrochemical Co.; Joseph Fleming Leete, Spreckles Sugar Corp.; Truman Sunderland Safford, patent attorney; Robert Louis Sebastian, American Agricultural Chemical Co.; Martin Melvin Spencer, Fink Corp.; Edgar H. Stone, Syrups Products Co., and Frederick C. Noyes, Phosphate Export Association; are among the new members of the Chemists' Club, New York.

Dr. Irving Langmuir, assistant director, research laboratory, General Electric Co., and president, American Chemical Society is chosen by trustees of Columbia University to receive the medal of the Charles Frederick Chandler Foundation for 1929. The medal will be awarded December 13 at a meeting at Columbia University, when Dr. Langmuir will lecture on "Electrochemical Reactions of Tungsten, Thorium, Caesium and Oxygen."

Sir Robert Balfour, until three years ago senior partner in Balfour, Guthrie & Co., San Francisco, dies in London, November 4, aged 85. He was born in Fifeshire, Scotland, in 1844, and went to California in 1869 accompanied by Robert Foreman and Alexander Guthrie to establish a branch of Balfour, Williamson & Co.

H. B. Bishop, C. O. Brown, E. R. Brundage, J. B. Churchill, J. G. Detwiler, C. R. Downs, H. B. Lowe, R. M. Palmer, H. P. Pearson, J. W. H. Randall, C. F. Roth and T. B. Wagner, are appointed members of the membership committee, the Chemists Club, New York.

R. J. Grant formerly assistant general manager, is appointed general manager, Noil Chemical & Color Works, New York, coal tar dyes, succeeding F. P. Summers, who is now associated with Calco Chemical Co.

R. L. Sibley, formerly patent specialist, Rubber Service Laboratories Division, Monsanto Chemical Works, is appointed director of research of the division, succeeding C. Olin North, resigned.

Dr. L. F. Nickell, vice-president in charge of the Monsanto, Ill., works, Monsanto Chemical Works, is elected as director, Union Trust Co., East St., Louis, Ill.

Irving Langmuir, president, American Chemical Society, is elected an honorary fellow of the Chemical Society.

## National Fertilizer Association Holds Fifth Annual Southern Meet

National Fertilizer Association holds fifth annual Southern meeting in the Atlanta-Biltmore Hotel, Atlanta, Ga., November 18 to 20. The meeting was featured by plans for greater intra-industry co-operation.

The first day of the session was given over to registration and to meetings of the soil improvement committee and of the board of directors. The second day was featured by a general session in the morning and the Fertilizer Industry Dinner in the evening. Among the speakers at the general session were, L. W. Rowell, president of the association, on "A Plantfood Institute"; Martin A. Morrison, Federal Trade Commission, on "Trade Practice in the Fertilizer Industry"; H. R. Smalley, director of soil improvement work, on "Teamwork for Increased Fertilizer Consumption"; and Ward H. Sachs, assistant director, on "Soil Improvement Work in the South."

E. L. Robins, president, Meridian Fertilizer Factory, presided at the banquet, and the speakers were Charles J. Brand, secretary of the association, on "Sales Methods and Policies in Europe"; and E. St. Elmo Lewis, on "Marketing Goods at a Profit." The closing day was given over to a round table discussion of the industry's problems limited to active members of the association.

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## Chemical Division, Commerce Dept., Inaugurates First "Chemical Day"

Chemical division, Bureau of Foreign and Domestic Commerce, holds first "Chemical Day" at the New York offices of the Bureau, November 21. At that time, C. C. Concannon, chief of the chemical division, spent the day in interviewing representatives of various chemical companies. Despite the fact that interviews were limited to fifteen minute periods, there were fully forty requests which could not be accommodated on that day.

The purpose of this day is to acquaint the industry further with respect to the services available through the chemical division, for bringing into closer contact the government agencies and industry. It is also sought to determine the needs of the chemical industry with the thought of further expansion of the chemical division's activities.

C. C. Concannon will be in New York one day each month for these conferences, and a definite date for each "Chemical Day" will be announced well in advance. Richard P. Hendren, of the New York office of the chemical division, Bureau of Foreign and Domestic Commerce, is in charge of details connected with "Chemical Day."

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American Association of Textile Chemists and Colorists holds ninth annual meeting, December 6 and 7, in the Bellevue-Stratford Hotel, Philadelphia. Among those who spoke at the general sessions were E. H. Killheffer, Newport Chemical Co., president of the association, on "Research"; Alan Claflin, L. B. Fortner Co., on "Behaviour of Ammonium Salts in the Dye Bath"; Dr. George L. Clark, University of Illinois, on "X-Ray Research on Textiles"; Arthur K. Johnson; Hughes L. Siever; Dr. Paul Krais; H. L. Platt; Margaret Hayden Rorke; Charles A. Siebert; Ormond W. Clark; Andrew Fisher; Louis S. Zisman.

Synthetic Organic Chemical Manufacturers' Association holds annual meeting in the Hotel Commodore, New York, December 13.

George Taylor, secretary, Fred L. Lavanburg Co., New York, dry colors, dies in Richmond Hill, N. Y., November 12, aged 53. He had been with the company since 1890.

George M. Eddy, president, A. S. Wolley Co., fertilizers, Seaford, Del. dies November 11, aged 67.

## *News of the Companies*

Atmospheric Nitrogen Co. produces approximately 130 tons of nitrogen from the air daily at its Hopewell, Va., plant, according to an estimate by Prof. Lauren Hitchcock, University of Virginia. This estimate is conservative, according to Dr. Hitchcock, but at current market-prices for nitrogen means an annual production by this plant of upward $12,000,000. He placed Virginia's total annual output of fertilizer materials in the neighborhood of $20,000,000, an industry, however, ranking only third among the State's chemical activities. Only three other States in the union have a chemical fertilizer output of this magnitude.

Dyestuffs department, E. I. du Pont de Nemours & Co., Inc., announces following new colors: Du Pont Scarlet Y for Lakes, and the following Durotone colors for wall paper printing and coated papers: Durotone Pink B Paste, Brown OY Paste, Yellow R Paste, and Blue G Paste. New Ponsol colors are Ponsol Red Violet RRNX Powder and Ponsol Pink double powder.

Century Carbon Co., Wishnick-Tumpeer subsidiary, announces that H. W. Perritt, formerly director, Louisiana Minerals division, State Department of Conservation, Monroe, La., is now general manager of the company's gas and land division. Previous to his connection with the Department of Conservation, he had been in charge of the Haines Oil Field.

Alweda Co., Brooklyn, N. Y., manufacturing chemist, is formed by merger of Allen-Foster, Inc., and the Weda Chemical Co. Temporary managing committee consists of Nicholas S. Gesoalde, president, and George S. Harkavy, secretary-treasurer, Allen-Foster, Inc.; and H. Schwartzbach, vice-president, and B. Grossman, secretary, Weda Chemical Co.

Titanium Pigment Co., Inc., New York, announces that the product formerly designated as "Titanox," will henceforth be known as "Titanox B"; and that the pigment formerly known as "Titanium Calcium Pigment" will be designated as "Titanox C."

Pennsylvania Salt Manufacturing Co. purchases General Laboratories, Madison, Wis., makers of a deodorant and fly spray. Company will be operated as separate unit, with Walter K. Wilson as general manager.

Ansbacher-Siegel Corp., New York, dry colors and insecticides, acquires Contex Color Co., Paterson, N. J., manufacturers of toners and lakes, founded in May, 1928, by L. D. Walker and S. H. Solomon.

General Dyestuff Corp., New York, announces the marketing of a synthetic wax, manufactured by the I. G. Farbenindustrie. The product comes in different grades suitable for different uses.

Solvay Sales Corp. publishes 24-page book entitled, "Solvay Liquid Caustic Soda," which gives complete information and instructions for unloading and handling liquid caustic soda.

Chemical Foundation, Inc., announces that it has taken over the business management of "The Journal of Physical Chemistry."

Union Carbide & Carbon Corp. announces removal of New York stock transfer office to 17 Battery pl.

General Chemical Co. announces removal of Philadelphia office to 1343 Arch st.

## Anglo-Chilean Nitrate Completes Negotiations with Lautaro Company

Anglo-Chilean Consolidated Nitrate Corp. acquires Lautaro Nitrate Co., an English company which is a large producer of nitrate with extensive holdings in Chile. The transaction involves a concurrent agreement by which Anglo-Chilean Consolidated Nitrate Corp. obtains outright ownership of all patents relating to the extraction of nitrates by the Guggenheim process. The patents were transferred against payment of the net cost of developing and obtaining the patents, plus interest amounting to about $267,000.

According to stockholders by E. A. Cappelen Smith, president, Anglo-Chilean Consolidated Nitrate Corp., that company, "has agreed to design and construct for the Lautaro company a new 540,000-ton Guggenheim process plant and has granted the Lautaro company a license to operate such plant. Cost of construction has been provided for through the sale of $32,000,000 twenty-five-year six percent convertible bonds of the Lautaro company. It is expected the plant will be completed and placed in operation before July 1, 1932. Representatives of your company have been elected to the Lautaro directorate and will control the latter's management."

Gross earnings of the Anglo-Chilean Consolidated Nitrate Corp. in six months ended June 30 were $2,363,774, compared with $1,974,118 in the corresponding 1928 period.

## Belle Chemical Co. Plans Synthetic Camphor Manufacture

Belle Chemical Co., Belleville, N. J., announces plans for manufacture of synthetic camphor on a commercial scale by January 1. Initial production will be between 500 and 1,000 pounds per day and present plant capacity is said to permit of an increase to a ton a day. Officers of the company are as follows: president, Jacob V. Smeaton, president also of S. M. Birch Lumber Co., Passaic; vice-president, Stewart Lindsley, president and owner, National Carbonic Gas Co., Newark; and treasurer, Edward F. L. Lotte, general manager, National Silk Dyeing Co., Patterson; and secretary and general manager, Charles A. Bianchi.

Financial structure of the company is as follows: Capitalization $500,000 of which amount half has been mailed in; 500 shares of preferred with par value of $100 each; 10,000 shares of A and 10,000 shares of B common stock. Stock is closely held by the officers and it is said that no public sale is contemplated.

## Du Pont Secures Interest in Oberkoks in Duco Agreement

E. I. du Pont de Nemours & Co., Inc., takes a stock interest in Oberkoks Chemical Co., Berlin, as the result of an agreement between the two companies by which the du Pont company grants the Berlin concern patent rights for the manufacture of Duco at the factory of Oscar Mosebach, Riesa, Saxony, subsidiary of the Oberkoks company.

Berlin company will have exclusive rights to manufacture Duco products in its territory. The du Pont company will accept stock in a new company as part payment, the remainder of the consideration being payable in cash. Agreement is no different from that which the du Pont company has entered into with the Australian Duco company and the French Duco company, both these companies having been granted exclusive rights to manufacture Duco products in their territories.

Insecticide & Disinfectant Manufacturers' Association holds sixteenth annual convention, December 9, 10 and 11, at the Hotel Commodore, New York. Among the speakers at the three-day session, featured by the annual banquet on the evening of December 10, were, C. C. Baird, J. P. Jordan, Major L. D. H. Weld, and Merle Aylesworth.

## Meetings to Aid Census Program Held Throughout Country

Advisory committee, Census of Manufactures, Department of Commerce, inaugurates, November 22, at the Hotel Pennsylvania, New York, a series of meetings designed to bring the practical use of the Census data to the attention of the manufacturers of the country in order that full co-operation may be received by the Census Bureau in gathering this information. Speakers at the opening meeting, which was attended by several hundred business men representing communities within a radius of 100 miles of New York, included Dr. Julius Klein, Assistant Secretary of Commerce; Colonel L. S. Horner, president, Niles-Bement-Pond Co.; Frederick H. Feiker, managing director, Associated Business Papers; and John E. Palmer, chief in charge of information of the census of manufactures.

The complete schedule of the other conferences of this nature is as follows: Philadelphia, Nov. 25; Atlanta, Nov. 27; Detroit, Nov. 29; Buffalo, Nov. 30; Pittsburgh, Dec. 2; Cleveland, Dec. 4; Chicago, Dec. 5; New Orleans, Dec. 7; Dallas, Dec. 9; St. Louis, Dec. 11; Omaha, Dec. 12; Denver, Dec. 14; Seattle, Dec. 17; San Francisco, Dec. 19; Los Angeles, Dec. 20, and the final meeting at Boston, Jan. 4.

## European Benzol Producers Form International Cartel

Benzene producers of Belgium, England, France, Germany, Ireland, Luxemburg, Netherlands and the Saar meet together in Paris and form an international cartel. It was arranged to create a permanent central international benzene committee, with offices in Paris, the next meeting of the committee to be held in London early next year, followed by a general meeting in Germany in June, 1930. The objects of the new group are the establishment of grades, propaganda work for the use of benzene and research on the improvement of benzene motor fuels. Uniform prices may also be anticipated.

One of the most important purposes of the alliance will be the promoting of the extended uses of benzene as a motor fuel. Although for the present the central offices are to be with the Paris Gas Co. there will ultimately be secretaries and official address in each of the countries represented.

M. H. Laurain, managing director, Paris Gas Co. has been appointed chairman of the permanent committee.

## Egg Albumen Duty Raised

Duty on egg albumen, in the form of crystals, as dried egg albumen, is fixed at 18 cents a pound in a decision rendered by the United States customs court. The protests of numerous large import houses, claiming duty at 6 cents a pound, under the provision for "egg albumen," prepared or preserved, and not specially provided for, were set aside by the court.

The court ruled that "considering this commodity as Congress would naturally have considered it, from a relative standpoint, it is dried."

Importers, whose protests are overruled, include the F. H. Shallus Co., Gallagher & Ascher, American Trading Co., S. W. Bridges & Co., Bridges, Neumer & Co., T. M. Duche & Sons, Exact Products Co., Wm. H. Foster & Co., French Kreme Co., Globe Shipping Co., Hans Hinrichs Chemical Corp., Importers Commission Co., Innis, Speiden & Co., A. Klipstein & Co., Joe Lowe Co., David L. Moss & Co., and Stein, Hall & Co.

E. I. du Pont de Nemours & Co., Inc., Ethyl Gasoline Corp., and Frigidaire Corp., establish an experimental laboratory at the University of Cincinnati for investigation of physiological effects of metals, poisons and general industrial chemicals.

Du Pont Rayon Co. announces starting of production of "Acele Rayon" production in company's new plant at Waynesboro, Va.

## Chemical Manufacturers Paid 5.73 Per Cent of Total Income Tax

Manufacturers of chemicals and allied products paid 5.73 per cent of the total corporation income tax collected by the Federal government on returns for the calendar year 1927, and the percentage of tax on the amount of net income was exceeded by only two other manufacturing groups.

An analysis of the 1927 tax returns issued by the Bureau of Internal Revenue shows that returns were filed by 7,229 corporations engaged in manufacturing chemicals and allied substances, including petroleum refining, fertilizers, drugs, oils, paints, and soaps. Of this total 3,960 corporations, or 54.78 per cent, reported a net taxable income, compared with the 57.40 per cent of all manufacturing concerns, which showed net income. The chemical firms showing net income for 1927 had a total gross income of \$6,799,331,331, and were allowed deductions of \$6,303, 474,059.

The total net income of these chemical manufacturers was \$495,857,272, but they were allowed a total of \$8,398,156 as net loss for the prior year. The total income tax collected from them was \$64,766,664, or 13.06 per cent of their net income, and amounted to 5.73 per cent of the total corporation income tax for that year.

After deducting returns from inactive corporations reporting no data, the Bureau of Internal Revenue reports that 40 per cent of the corporations manufacturing chemicals in 1927 (numbering 2,892) reported no net income. These had a gross income of \$1,969,078,193, and were allowed deductions totaling \$2,079,447, 208, leaving a deficit of \$110,369,015. Among all manufacturing corporations there was a total of 38.75 per cent reporting no net income.

Gross sales of all chemical manufacturing corporations filing returns for 1927 totaled \$8,036,189,168, and the gross profits from the sales totaled \$2,273,447,055. Dividends on stock of domestic corporations held by chemical manufacturing companies totaled \$189,921,926. The compiled net profits of all chemical manufacturing companies reporting, including those with no taxable income, and before deductions permitted by law, totaled \$588, 221,212. The companies distributed \$521,280,397 in cash dividends and \$12,413,473 in stock dividends during 1927.

The bureau divided chemical manufacturing corporations into four groups. Returns were received from 633 petroleum and mineral oil refining concerns, of which 267 had net incomes, totaling \$157,388,266, and paid an income tax of \$20,811,404. Manufacturers of chemicals proper (acids, salts, and other compounds) filed 412 returns of which, 230 showed a net income: this totaled \$84,774,345 and was taxed at \$11,347,923. Manufacturers of allied chemical substances, such as drugs, oils, paints, soap, and other chemical substances not elsewhere specified, filed 5,906 returns, of which 3,298 showed a net income, this being \$248,117, 091, taxed at \$31,977,384. Fertilizer manufacturing corporations filed 278 returns, of which 165 showed a net income of \$5,577,570 and paid a tax of \$629,953.

Anhydrous aluminum chloride is quoted in Germany at about 16 cents per pound in 10-ton lots or 19 cents per pound in half-ton lots. Its importance not only in petroleum refining but in more intensive application in the classic Friedal and Crafts and Gotterman reactions are recognized, according to the Department of Commerce. Desulfurizing oil is said by some to be a possible new outlet for cheap aluminum chloride. This product is manufactured and marketed in Germany by the I. G., Dr. Alexander Wacker, J. D. Riedel, E. de Haen, and A. G. Egestorff, Salzwerke & Chemsche Fabriken.

New Orleans Association of Commerce publishes a twenty-five page booklet entitled, "Industrial Chemical Opportunities at New Orleans," which is a statement of facts concerning New Orleans as a suitable location for chemical industries, prepared by J. F. Coleman Engineering Co. Copies are available upon request.

# U. S. Chemical Exports Increase 13 Per Cent for Nine Months

**Imports also Show Increase of 4 Per Cent over Corresponding Period of Last Year—Total Imports of Industrial Chemicals Show Gain of 30 Per Cent—Still $9,000,000 Below Total Exports of this Classification.**

Exports of chemicals and allied products from the United States increased 13 per cent to $158,730,000 for the first nine months of 1929. Imports also increased 4 per cent to $176,419,000 as compared with the same period of last year.

Although a gain of 30 per cent was made in total imports of industrial chemicals, they were still $9,000,000 below the total exports of this classification, which advanced only five per cent, according to the Department of Commerce.

Of the imports of industrial chemicals, amounting to $22,466,000, the commodities accounting for the greater part of the trade and making the increase were arsenious acid, $734,000; tartaric acid, $511,000; acetic acid, $1,726,000; cobalt oxide, $646,000; crude glycerin, $753,000; refined glycerin, $445,000; crude iodine, $1,500,000; potassium carbonate, $762,000; potassium hydroxide, $783,000; potassium nitrate, $378,000; argols, $1,216,000; sodium cyanide, $2,368,000; and miscellaneous chemical compounds, $4,905,000.

Month by month this year some specific sodium compounds have been entering the United States in greater amounts for each single month than previously for any entire year. An exceedingly large amount, or $212,000 worth of sodium carbonate, calcined, or soda ash has been imported into the United States, 99 per cent of which has entered Michigan from Canada. Over $800,000 worth of crude sodium sulfate, $200,000 of sodium silicofluoride, and $350,000 of sodium chlorate have been received during the first nine months of 1929.

Almost two-fifths of the industrial chemical specialties exported, to the amount of $11,032,000, was comprised of insecticides, disinfectants, and similar preparations. After having been shipped in slightly too large amounts to be consumed in 1928, this class recorded a small reduction of $241,000 to $4,282,000, for the nine months of 1929. This loss was in the household insecticides and not those preparations sold for agricultural use.

The chief changes in the exports of industrial chemicals, valued at $20,666,000, were larger sales of acetone, to $559,200; nitrocellulose or acetocellulose, solutions, to $451,400; calcium chloride, to $327,200; dextrine, to $795,000; hydrogen peroxide, to $296,010; anhydrous ammonia, to $303,700; chlorine, to $195,600; oxygen, to $80,200, and other gases, to $299,800.

Although the total exports of sodas and sodium compounds changed but little, there were several decided changes in the individual items; for example, only about half as much bichromate and chromate and two-thirds as much borate were exported. These losses were partially offset by larger shipments of the carbonates—soda ash and sal soda—with a trade of $1,100,000 worth; of the modified sodas, $400,000; hydroxide, $2,740,000; and miscellaneous sodium compounds, $1,700,000.

A rather outstanding contrast in the fertilizer trade was the upward trend in the outbound trade and the downward trend in the inbound. Total foreign shipments of fertilizers and materials, amounting to $15,311,000 (1,155,000 tons), surpassed those of the corresponding period of 1928 by 19 per cent. The improvement was general except in superphosphates.

After a somewhat lessened demand from foreign countries, owing to competition and overstocking, ammonium sulfate shipments improved to 99,000 tons, valued at $4,328,000. Other nitrogenous materials advanced to 15,000 tons, $746,000; phosphate rock to 855,000 tons, $4,000,000; and prepared fertilizer mixtures to 27,000 tons, $1,443,000.

Fertilizers entering the country declined 10 per cent to $56,000,000 (1,760,000 tons), attributable partly to the drop in price of some commodities and partly to overstocking last year. Most conspicuous among the losses were those of sodium nitrate, from $30,881,000 (853,600 tons) to $28,740,000 (767,000 tons); ammonium-sulfate-nitrate, from $4,240,600 (73,700 tons) to $571,800 (10,000 tons); tankage, from $1,077,300 (38,700 tons) to $570,000 (14,400 tons); ammonium sulfate, from $1,069,000 (23,000 tons) to $688,000 (16,800 tons); potash chloride, from $6,378,000 (182,300 tons) to $5,952,200 (166,200 tons); potash sulfate crude, from $3,245,000 (71,900 tons) to $2,557,300 to $2,557,300 (55,600 tons); and manure salts, from $4,214,600 (320,900 tons) to $3,655,800 (278,500 tons).

One-quarter more coal-tar products were shipped to foreign countries in the January-September, 1929, period than in the 1928, or a total of $13,538,000. The expansion occurred, for the most part, in benzol, which accounted for 45 per cent, and colors, dyes, and stains, forming 43 per cent of the total. Exports of colors, dyes, and stains other than household dyes improved from $4,345,000 (18,000,000 pounds) to $5,581,000 (28,148,000 pounds). Coal-tar medicinals declined most markedly from $257,300 (664,200 pounds) to $133,000 (124,700 pounds).

In the inbound trade the most conspicuous change was made in the 30 per cent loss in imports of creosote oil to $7,573,000 (58,867,000 gallons), explainable by greater production in the domestic industry. Imports of colors, dyes, and stains, amounting to $6,566,000 (5,839,000 pounds), were not only one-third greater than during the corresponding period of 1928, but were very nearly $1,000,000 above the exports.

Exports of naval stores, gums and resins advanced 21 per cent from $19,422,000 in January-September, 1928, to $23,474,000 in January-September, 1929. One-third more spirits of turpentine left the United States during the January-September, 1929, period, or a total of $6,443,000 (12,275,000 gallons). Notwithstanding the adoption to a greater extent of synthetic resins in place of the natural gums, particularly for protective coatings, imports, nevertheless, were one quarter more in January-September, 1929, and reached $27,484,000, a figure one-sixth of the total import of chemicals and allied products. Varnish gums including shellac, advanced from $13,736,000 (64,912,000 pounds) to $17,032,000 (80,391,000 pounds).

## U. S. Exports 700,000 Tons of Sulfur

United States now exports annually about 700,000 long tons of sulfur in addition to supplying most of the domestic market, according to a report by the Bureau of Mines. This position is contrasted with recent years when the nation was dependent upon foreign deposits.

From 1917 to 1928, inclusive, average annual production of brimstone in the United States amounted to 1,608,000 long tons, compared with an annual average of 365,000 tons for the period 1904 to 1916. Imports of foreign sulfur during the period were negligible. Exports during the period averaged annually about 449,000 long tons, increasing from 152,736 tons in 1917 to 789,274 tons in 1927, but decreasing 13 per cent in 1928 to 685,051 tons.

Domestic pyrites production decreased from an average annual of 296,000 long tons (1904-1916) to an average annual of 257,000 tons (1917-1928), whereas pyrites imports dropped from an average annual of nearly 800,000 long tons for the earlier period to an average of 379,000 tons for the later. Domestic consumption, exclusive of any utilization of by-product smelter fumes of sulfur as brimstone and pyrites, increased during the same time from an average of 794,000 tons to an average of about 1,374,000 tons.

Holzverkohlungs Industrie A. G. (Haig) of Constance has been granted German Letters Patent No. 475,428 covering its new process for producing actone from ethyl alcohol, by treating it with water vapor in the presence of catalysts such as iron oxide, manganese hydroxide, copper oxhydrate, and copper carbonate. The process is not at present economical in Germany on account of the high price of alcohol, although it is said to be in operation in England, reports the Department of Commerce.

# The Financial Markets

## Solvay American Investment Corp. Five-months' Net at $2,198,470

**Company's Investments Carried on Balance Sheet at Cost of $79,891,529—Chief Holding Consists of 466,488 Shares of Allied Chemical Stock—Market Value and Cost of Holdings Compared as of August 31.**

Solvay American Investment Corp. reports for five months ended August 31, 1929, net profit of $2,198,470 after interest, expenses, taxes, etc. Stock consists of 250,000 shares (par $100) of 5½% preferred and 300,000 no-par shares of common. On August 31, 1929, the market value of securities held exceeded book values by $85,185,309, exclusive of $127,177 securities not quoted, which are valued at cost.

Income account for five months ended August 21, 1929, follows: Dividends received $1,124,462; profit on realization of investments $1,268,520; interest, etc., $283,698; total income $2,676, 680; expenses, interest, taxes, etc., $478,210; net profit $2,198 470.

The investments include certain common shares of Allied Chemical & Dye Corp., 359,000 of which shares are deposited as security for the $15,000,000 15-year 5% secured notes, Series A, of Solvay American Investment Corp., and an additional 62,500 of which shares are deposited in escrow to be delivered to such registered owners of the stock purchase warrants attached to its 5½% cumulative preferred stock as may exercise the subscription privilege to subscribe for those 62,500 shares; when any of these shares are subscribed for by owners of the warrants, the corporation is obligated to pay to the previous owner of the shares an additional $80 a share for each share sold at not less than $325 a share.

Market value and cost of the company's investments as of certain dates are as follows, according to the "Wall St. Journal."

| | *Mar. 31, '28* | *Mar. 31, '29* | *Aug. 31, '29* |
|---|---|---|---|
| Market value | $67,091,482 | $107,379,740 | $165,076,839 |
| Cost | 56,528,163 | 54,362,466 | 79,891,529 |
| Difference | $10,563,319 | $ 53,017,274 | $ 85,185,310 |

Investments as of August 31, with number of shares and marketvalue, follow:

| *Industrials:* | *Shares* | *Mkt Value* |
|---|---|---|
| General: | | |
| American Int'l Corp. common | 18,760 | $ 1,655,570 |
| Bethlehem Steel Corp., common | 666 | 91,991 |
| Kreuger & Toll Co., A. C. for par db | 19,200 | 758,400 |
| Montgomery Ward & Co., common | 666 | 91,242 |
| U. S. Steel Corp., common | 500 | 128,250 |
| Westinghouse El. & M. Co., common | 500 | 144,000 |
| Oil: | | |
| Shell Union Oil Corp., common | 2,000 | 58,000 |
| Texas Corp | 1,000 | 70,125 |
| Vacuum Oil Co | 500 | 63,000 |
| Public utilities: | | |
| Consolidated Gas Co. of N. Y., com | 500 | 90,375 |
| Banks and trust companies: | | |
| Bankers' Trust Co. of N. Y | 1,000 | 184,500 |
| First National Bank of N. Y | 100 | 788,750 |
| Guaranty Trust Co. of N. Y | 642 | 634,617 |
| Foreign: | | |
| Hydro-El. Sec. Corp., 5% par pref B | 10,000 | *25,030 |
| Int'l Holding Co., Ltd., common | 400 | |
| French & For. Inv. Corp., pf. 5% pd | 2,000 | *102,146 |
| French & F. Inv. Corp., cm. fully pd | 2,000 | |
| Specials: | | |
| Allied Chemical & Dye Corp., common | 466,488 | 156,708,300 |
| Libbey-Owens Sec. Corp., res v. t. c | 12,139 | 2,429,992 |
| †Libbey-Owens S. Corp., unr. v. t. c | 1,000 | |
| Part. of ⅛th in purchase of: International Holding Co., Ltd., and S. A. Fab. de Soie Art. de Tubize | | 1,052,549 |
| | | $165,076,839 |

*Valued at cost. †Market values based on market value of holdings of Securities Corp.

## Du Pont Declares Extra of 70 Cents Per Share on Common

E. I. du Pont de Nemours & Co. declares an extra dividend of 70 cents on common stock in addition to the regular quarterly dividend of $1 on the common and $1.50 on the debenture stock. Extra common dividend is payable January 4 and regular December 14, both to stock of record November 27. Debenture dividend is payable January 25 to stock of record January 10. This carries out the custom of the company of passing on to stockholders the greater part of the extra payments received from its holdings in the General Motors Corp. which previously declared an extra dividend of 30 cents a share. The du Pont company holds or controls 22.94 per cent of the stock of the General Motors Corporation and has always paid to du Pont stockholders the extra dividends received from such holdings. An extra dividend of 50 cents a share was paid by du Pont on July 3, reflecting an extra General Motors dividend of 30 cents paid on July 2.

## Allied Chemical and Dye Declares 5 Per Cent Stock Dividend

Allied Chemical and Dye Corp. declares a 5 per cent stock dividend and announces that in view of the economic progress of the company it was expected that the payment of an annual stock dividend would be continued. The directors also declared the regular quarterly dividends of $1.50 a common share and $1.75 a preferred share.

The stock dividend is voted to common stockholders of record of Dec. 11, payable on Jan. 3, 1930, "or as soon thereafter as approval to list the additional shares on the New York Stock Exchange is granted." The cash dividend on the common stock is payable on Feb. 1, 1930, to stockholders of Jan. 15, and the preferred dividend on Jan. 2 to holders of record of Dec. 11.

## J. T. Baker Offers New Rights and Declares Extra Dividend

J. T. Baker Chemical Co. declares an extra dividend of 11¼ cents and the regular quarterly dividend of 18¾ cents on the common stock, both payable December 31 to stock of record December 14. Directors propose to continue the 30 cents as a quarterly dividend, placing the stock on a $1.20 annual basis compared with 75 cents heretofore.

Stockholders of record November 20, 1929 have been offered rights to subscribe to additional stock at $20 per share in the ratio of one new share for each share held. Rights will expire and payment is due December 2. Any common stock so offered for subscription which is not subscribed for on or before December 2, 1929 will be offered for sale at not less than $20 a share at such times and in such manner as the officers may determine.

Commercial Solvents Corporation declares an initial quarterly dividend of 25 cents on its new stock, placing the stock on a $1 annual basis, equal to $10 on the old stock prior to the recent ten-for-one split-up on which $8 annually was paid.

Nichols Copper Co. declares regular quarterly dividend of 43¾ cents a share on its Class A stock, payable January 2 to stock of record December 20.

Hercules Powder Co. declares extra dividend of $1 and regular quarterly dividend of 75 cents on common, both payable December 24 to stock of record December 13.

## Twelve Chemical Companies Show 28% Combined Profit Increase

Twelve chemical companies, show in their published profit figures for the first nine months of 1929 a combined increase of 28.17 per cent. in comparison with the corresponding period in 1928, according to Ernst & Ernst, accountants.

The comparative figures are as follows:

| | *1929* | *1928* |
|---|---|---|
| Air Reduction Co., Inc. | $4,876,570 | $2,528,166 |
| Columbian Carbon Co. | 2,887,787 | 2,105,851 |
| Commercial Solvents Corporation | 2,809,662 | 2,099,774 |
| Freeport Texas Co. | *2,742,876 | *1,952,393 |
| Mathieson Alkali Works | 1,726,904 | 1,560,020 |
| Monsanto Chemical Works | 970,039 | 692,000 |
| Nat. Distillers Products Corp. | 462,845 | 311,218 |
| Newport Co. | 1,173,952 | 622,313 |
| Texas Gulf Sulphur Co. | 11,480,489 | 10,355,381 |
| Union Carbide & Carbon Corp. | 24,050,664 | 19,629,483 |
| United Carbon Co. | 1,079,186 | 581,742 |
| Westvaeo Chlorine Products Corp. | 841,840 | 481,756 |
| Total | $55,011,614 | $42,921,077 |

*Note*—Where figures published are before certain charges they have been so included here. *Nine months ended August 31.

## Westvaco Chlorine Products Nine-months' Net at $841,840

Westvaco Chlorine Products Corp. and subsidiaries report for nine months ended September 28, 1929, net profit of $841,840 after interest, depreciation and federal taxes, equivalent after allowing for dividend requirements on 7% preferred stock, to $3.21 a share on 225,109 no-par shares of common stock. This compares with net profit in corresponding period of 1928 of $481,756, or $1.61 a share, computed on above number of common shares.

Current assets on September 28, last, including $1,446,852 cash, call loans and temporary investments amounted to $2,575,145, comparing with $1,685,537 on same date in 1928 while current liabilities totaled $251,345 against $471,624.

## Monsanto Third Quarter Net Equivalent to 75 Cents a Share

Monsanto Chemical Works for quarter ended September 30, 1929, reports net profit of $234,614 after charges and federal taxes, equivalent to 75 cents a share on 310,852 shares of no-par stock. This compares with $255,728 in third quarter of 1928, or 82 cents a share, based on same number of shares.

Net profit for nine months ended September 30, 1929, was $878,840 after above charges, equal to $2.83 a share on 310,852 shares of stock, compared with net profit of $682,980 or $2.23 a share on present share basis in first nine months of previous year.

## Duval Sulphur Changes Capitalization

Stockholders of Duval Texas Sulphur Co. authorize a change in the present capitalization of 100,000 shares of $10 par value to 550,000 shares of no-par value. Five new shares were issued for each share now held. Additional 50,000 shares not required for the split-up will be held in the company's treasury for expansion purposes. The split-up was effective November 15.

Atlas Powder Co. declares extra dividend of $1 and regular quarterly dividend of $1 on common, both payable December 10 to stock of record November 29.

Tennessee Copper & Chemical Corp. declares regular quarterly dividend of 25 cents, payable December 16 to stock of record November 30.

International Salt Co. declares regular quarterly dividend of $1.50, payable January 2 to stock of record December 16.

## Newport Company Offers New Common at $20 Per Share

Newport Co. offers common stockholders right to subscribe to additional common at $20 a share in ratio of one new share to every forty held November 23. Holders of class A convertible stock who convert and become holders of record of common on November 23 will be entitled to the rights. Rights expire and subscriptions are payable in full December 20.

Company declared regular quarterly dividends of 75 cents on class A convertible stock and 50 cents on common, both payable December 2 to stock of record November 23.

Report of Newport Co. and subsidiaries for quarter ended September 30, 1929, shows net profit of $442,335 after interest, depreciation and federal taxes, equivalent after dividend requirements on 64,791 shares of $3 class A stock outstanding at end of period, to 95 cents a share on 404,565 no-par shares of common stock.

For nine months ended September 30, net profit totaled $1,173,952 after above charges, equal to $2.54 a share on 404,565 common shares against $622,313 or $1.31 a share on 251,250 shares in first nine months of previous year.

## Anglo-Chilean Reports Six-months' Net Loss of $1,331,760

Anglo-Chilean Consolidated Nitrate Corp. and subsidiaries report for six months ended June 30, 1929, net loss of $1,331,760 after interest, taxes, amortization, depreciation and depletion, etc.,comparing with net loss of $902,278 in first six months of 1928.

Statement shows gross earnings of $2,363,774, compared with $1,974,118 for the same period in 1928 and $330,952 for that in 1927. After interest on floating indebtedness, taxes and miscellaneous charges, net earnings to surplus were $1,269,367, against $1,434,842 for the first half of 1928 and $119,759 for the 1927 period.

After deducting $1,141,656 for interest charges on British debenture stock and on American debenture bonds for the six months, a surplus of $127,711 before depreciation and depletion remained. After depreciation and depletion charges of $1,459,470, there was a deficit of $1,331,760.

Sherwin-Williams Co. of Canada, Ltd., manufacturer of paints, varnishes and lacquers, reports for fiscal year ended August 31, 1929, net income of $772,115 after depreciation, interest, taxes and pension fund, equivalent after dividend requirements on 7% preferred stock, to $2.65 a share on 200,000 shares of no-par common stock. This compares with $772,873 or $2.66 a share in previous year, based on present share basis.

Monroe Chemical Co. reports for ten months ended October 31, 1929, (including Mary T. Goldman Co. for three months) net profit of $333,011 after charges and federal taxes, equivalent after dividend requirements on 30,000 $3.50 no-par preference shares, to $2.45 a share on 100,000 no-par shares of common stock.

International Printing Ink Corp. declares a quarterly dividend of 75 cents on the common, placing issue on $3 annual basis against $2.50 previously. The regular quarterly dividend of $1.50 on the preferred was also declared, both dividends payable February 1 to stock of record January 13.

Imperial Chemical Industries Ltd., has purchased 3,000,000 marks of total 12,000,000 marks capital of Hirsch Copper Co., Berlin, large metal trade and rolling mill undertaking.

Virginia Carolina Chemical Corp. declares regular quarterly of $1.75 on prior preferred stock, payable December 5 to stock of record November 20.

Link Belt Co. declares regular quarterly dividend of 65 cents, payable December 1 to stock of record November 15.

# The Industry's Stocks

| 1929 Nov. 27 High | 1929 Nov. 27 Low | 1929 High | 1929 Low | 1928 High | 1928 Low | Sales In Nov. | Sales Since Jan. 1 | ISSUES | Par $ | Shares Listed | An. Rate | Earnings $-per share-$ 1929-1928 | | 1927 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | NEW YORK STOCK EXCHANGE | | | | | | |
| 131⅛ | 126⅛ | 223⅞ | 77 | 99⅞ | 59 | 278,700 | 2,167,700 | Air Reduction | No | 769,000 | $3.00 | 9 mo. | 5.63 | 4.61 |
| 245½ | 242 | 354¾ | 197 | 252¾ | 146 | 125,020 | 941,420 | Allied Chem. & Dye | No | 2,178,169 | 6.00 | 1928 | 11.12 | 10.03 |
| 124 | 122 | 125 | 118½ | ... | ... | 6,400 | 40,900 | 7% pfd. | 100 | 392,849 | 7% | 1928 | 68.63 | 62.59 |
| 6¾ | 6¾ | 23⅜ | 4 | 26 | 15⅝ | 16,100 | 186,800 | Am. Agricultural Chem. | 100 | 333,221 | ... | | | 1.59 |
| 26¼ | 24¼ | 73¾ | 18 | 79⅞ | 55⅝ | 17,600 | 85,800 | pfd. | 100 | 284,552 | ... | | 2.47 | 7.86 |
| 114¾ | 110⅝ | 184½ | 86 | 117⅞ | 70⅛ | 797,000 | 5,481,100 | American Can | .25 | 2,473,998 | 4.00 | 1928 | 6.86 | 4.11 |
| 140¾ | 140 | 142 | 133⅛ | 147 | 136¾ | 5,800 | 42,600 | pfd. | 100 | 412,333 | 7% | 1928 | 48.17 | 31.66 |
| 28½ | 27⅝ | 55 | 20 | 87⅞ | 74 | 58,800 | 423,300 | Amer. Com. Alc. | No | 380,000 | 1.60 | 9 mo. | 2.59 | 3.39 |
| 42¼ | 40⅞ | 81¾ | 31½ | 63¾ | 39 | 98,300 | 2,117,200 | American Metal, Ltd. | No | 868,000 | 3.00 | 6 mo. | 1.73 | 3.58 |
| 112 | 109 | 135 | 106 | 117⅛ | 109 | 1,100 | 32,400 | pfd | 100 | 69,000 | 6% | 6 mo. | 24.10 | 26.52 |
| 72¼ | 70 | 130¼ | 62 | 293 | 169 | 341,400 | 3,901,200 | American Smelt. & Refin. | No | 1,830,000 | 4.00 | 6 mo. | 5.03 | 8.24 |
| 135 | 134½ | 138 | 123⅛ | 142 | 131 | 6,500 | 41,800 | pfd. | 100 | 500,000 | 7% | 6 mo. | 21.90 | 37.17 |
| 10½ | 9⅞ | 49¼ | 7 | 57 | 6⅝ | 41,900 | 711,800 | Amer. Zinc & Lead | 25 | 200,000 | ... | 3 mo. | 0.97 | .. |
| 61¾ | 57⅝ | 111¼ | 40¾ | 117⅞ | 40 | 7,200 | 86,600 | pfd. | 25 | 96,560 | 6.00 | 3 mo. | 3.92 | d5.99 |
| 77¾ | 85⅛ | 140 | 70 | 120¼ | 53¾ | 2,524,400 | 32,064,600 | Anaconda Copper Mining | 50 | 8,796,000 | 7.00 | 1928 | 6.63 | 3.37 |
| 26¼ | 25 | 40½ | 18½ | 112⅞ | 55¼ | 37,800 | 529,200 | Archer Dan. Mid. | No | 481,000 | 2.00 | 9 mo. | 0.49 | 8.04 |
| ... | ... | ... | ... | ... | ... | | 2,120 | pfd. | 100 | 41,000 | 7% | 9 mo. | 22.10 | 46.94 |
| 81 | 81 | 140 | 67 | 114 | 63 | 20,500 | 288,700 | Atlas Powder Co. | No | 261,438 | 4.00 | 9 mo. | 6.29 | 4.30 |
| 97 | 97 | 106½ | 90 | 110⅛ | 102 | 1,060 | 6,720 | pfd. | 100 | 90,000 | 6% | 9 mo. | 22.77 | 18.76 |
| 41⅛ | 40⅝ | 77⅞ | 30 | 66⅛ | 50 | 347,300 | 6,732,700 | Atlantic Refining | 25 | 2,670,000 | 1.00 | 6 mo. | 3.06 | 7.72 |
| 4⅛ | 4 | 9½ | 2 | 12¼ | 4⅛ | 40,200 | 406,300 | Butte Copper & Zinc | 5 | 600,000 | ... | 9 mo. | 0.27 | 0.31 |
| 6 | 6 | 12⅜ | 5 | 16¾ | 8¾ | 6,500 | 156,300 | Butte Superior Mng. | 10 | 290,198 | 2.00 | 1928 | 0.28 | 0.94 |
| 27 | 26⅞ | 47⅛ | 20 | 122 | 65 | 47,600 | 556,300 | By Product Coke | No | 760,000 | 1.00 | 9 mo. | 2.10 | 6.59 |
| 1¼ | 1⅛ | 4 | 1 | 5⅝ | 1¾ | 18,000 | 264,900 | Calla Lead & Zinc | 10 | 724,592 | ... | 6 mo. | | |
| 33¾ | 32⅛ | 61⅞ | 25 | 47⅝ | 20⅛ | 165,200 | 2,497,500 | Calumet & Hecla | 25 | 2,001,000 | 4.00 | 6 mo. | 1.24 | 1.55 |
| 14 | 14 | 32 | 11½ | 119 | 61½ | 27,600 | 336,700 | Certainteed Prod. | No | 400,000 | ... | 6 mo. | | |
| 59⅝ | 56 | 81½ | 46 | 63⅛ | 23⅛ | 900 | 10,500 | 7% pfd. | 100 | 62,904 | 7% | 6 mo. | 10.63 | 6.77 |
| 75 | 60½ | 127½ | 53 | 74⅞ | 37⅝ | 1,000 | 1,334,700 | Chile Copper | 25 | 4,415,497 | 3.50 | 6 mo. | 3.32 | 4.52 |
| 145 | 140 | 344 | 105 | 134¾ | 79 | 79,600 | 758,600 | Columb Carbon | No | 457,000 | 4.00 | 6 mo. | 4.56 | 6.30 |
| 28 | 26⅝ | 63 | 20⅛ | 250¼ | 137⅞ | 849,300 | 1,812,000 | Commercial Solvents | No | 227,000 | 8.00 | 6 mo. | 7.94 | 13.20 |
| 51¾ | 50 | 92 | 40½ | 64⅛ | 53 | 224,100 | 4,055,600 | Cont. Can | No | 1,714,000 | 2.50 | 1928 | 4.35 | 7.55 |
| 125⅛ | 125 | 126 | 115 | 128 | 123 | | 2,280 | pfd. | 100 | 49,000 | 7% | 1928 | 135.66 | 86.82 |
| 88⅝ | 87 | 126⅜ | 70 | 94 | 64⅝ | 145,900 | 2,207,200 | Corn Products | 25 | 2,530,000 | 3.00 | 6 mo. | 2.36 | 4.35 |
| 140 | 140 | 144¾ | 137 | 146¾ | 138⅛ | 2,820 | 31,580 | pfd. | 100 | 250,000 | 7% | 6 mo. | 27.46 | 50.98 |
| 29 | 28 | 69½ | 21¼ | 68¾ | 34⅝ | 49,500 | 1,456,800 | Davison Chem. | No | 504,000 | ... | | 3.34 | 11.58 |
| 37 | 37 | 64⅞ | 24 | 61 | 40 | 17,400 | 185,400 | Devoe & Rayn A | No | 160,000 | 2.40 | 6 mo. | †2.87 | †5.95 |
| 110 | 102 | 115½ | 102 | 120 | 108 | | 2,970 | 1st pfd. | 100 | 16,000 | 7% | 6 mo. | 31.54 | 64.02 |
| 116 | 113½ | 119¾ | 107½ | 121½ | 114 | 16,400 | 87,400 | Dupont deb. | 100 | 978,000 | 6% | 9 mo. | 62.43 | 69.06 |
| 113 | 109¼ | 213 | 80 | 503 | 310 | 327,000 | 2,082,100 | Dupont de Nemours | 20 | 10,322,000 | 4.00 | 9 mo. | 5.64 | 5.97 |
| 176 | 173⅛ | 264¾ | 150 | 194½ | 163 | 84,500 | 960,000 | Eastman Kodak | No | 2,223,000 | 5.00 | 1928 | 9.60 | 9.61 |
| 123 | 119½ | 128 | 117 | 132¼ | 123½ | 440 | 3,350 | pfd. | 100 | 61,657 | 6% | 1928 | 326.17 | 326.68 |
| 187 | 125 | 310 | 125 | 230 | 120 | 100 | 8,400 | Fed. Mining & Smelting | 100 | 50,400 | ... | 6 mo. | 25.61 | 24.15 |
| 36½ | 35½ | 54⅞ | 23¾ | 109¼ | 43 | 123,700 | 920,500 | Freeport Texas | No | 729,844 | 4.00 | 9 mo. | 3.76 | 4.49 |
| 50⅞ | 50⅛ | 94¾ | 42¼ | 94⅞ | 141½ | 76,000 | 1,060,600 | General Asphalt | 100 | 238,000 | ... | 6 mo. | 1.41 | 2.79 |
| ... | ... | ... | ... | 150 | 132 | | 44,200 | pfd. | | | 5% | 6 mo. | d6.97 | 13.89 |
| 35½ | 33⅞ | 64⅛ | 26 | 37 | 20⅝ | 105,200 | 1,457,000 | Glidden Com. | No | 676,000 | 2.00 | 9 mo. | 2.79 | 3.55 |
| 101 | 101 | 106⅛ | 95 | 105 | 95 | 1,930 | 9,730 | prior pfd. | 100 | 74,000 | 7% | 9 mo. | 26.46 | 32.69 |
| 40¾ | 39¼ | 82 | 31½ | 143¼ | 71 | 482,500 | 5,867,400 | Gold Dust | No | 1,764,000 | 2.50 | 1928 | 1.33 | 0.82 |
| ... | ... | ... | ... | 380 | 192 | | 4,470 | Hercules Powder | No | 566,000 | 3.00 | 9 mo. | 4.41 | 22.04 |
| ... | ... | ... | ... | 125 | 118½ | | 1,280 | pfd. | 100 | 114,241 | 7% | 9 mo. | 28.33 | 35.35 |
| 53⅞ | 50⅛ | 79½ | 40 | 84 | 64⅛ | 34,600 | 172,300 | Household Prod. | No | 575,000 | 3.50 | 6 mo. | 2.64 | 5.22 |
| 4⅝ | 4¼ | 17⅞ | 4 | 20⅞ | 13 | 14,100 | 201,800 | Intern. Agri. | No | 444,000 | | | 0.79 | 1.66 |
| 48 | 48 | 88½ | 40 | 85 | 48⅝ | 3,000 | 23,900 | pfd. | 100 | 100,000 | 7% | | 10.54 | 14.47 |
| 30⅝ | 28⅝ | 72¾ | 25 | 46 | 41½ | 1,156,300 | 15,385,400 | Intern. Nickel | No | 13,777,000 | 1.00 | 6 mo. | 0.75 | 1.05 |
| 50 | 49½ | 68⅜ | 40 | 60 | 47¾ | 11,300 | 158,900 | Int. Print Ink | No | 273,000 | 2.50 | 6 mo. | 3.55 | 2.96 |
| 63 | 61 | 90¾ | 55½ | 69 | 49½ | 540 | 75,500 | Intern. Salt | 100 | 60,771 | ... | 6 mo. | 3.80 | 7.23 |
| 120½ | 120½ | 123 | 118 | 202 | 96¼ | 199,100 | 3,231,400 | Johns-Manville | No | 750,000 | 3.00 | 9 mo. | 6.84 | 6.75 |
| 55⅞ | 54 | 113⅞ | 40 | 124½ | 63⅛ | 45,400 | 729,700 | Liquid Carbonic Corp. | No | 311,000 | 4.00 | 8 mo. | 2.51 | 8.11 |
| 34 | 33 | 46 | 40¼ | 57¾ | 45 | 6,400 | 67,500 | Mac and Forbes | No | 384,000 | 2.60 | 6 mo. | 1.46 | 3.30 |
| 39⅞ | 37½ | 72⅜ | 29 | 190 | 117¾ | 125,500 | 897,880 | Mathieson Alk. | No | 637,000 | 2.00 | 9 mo. | 2.67 | 4.35 |
| 124⅜ | 123 | 125 | 120 | 130 | 115 | 420 | 3,530 | pfd | 100 | 28,000 | 7% | 9 mo. | 60.95 | 84.50 |
| 28 | 26½ | 54½ | 20 | 33 | 17¾ | 70,600 | 1,721,800 | Miami Copper | 5 | 747,116 | 4.00 | 1928 | 1.96 | 1.53 |
| 50 | 49 | 80½ | 47 | ... | ... | | 5,025 | Monsanto Chem. | No | 311,000 | 1.25 | 6 mo. | 5.13 | 7.52 |
| 35¼ | 34¼ | 58 | 15 | 58⅛ | 29¼ | 63,700 | 1,021,400 | National Dist. Prod. | No | 168,000 | ... | 6 mo. | 2.99 | ... |
| ... | ... | ... | ... | ... | ... | | 243,900 | pfd. tem. ctfs. | ... | ... | ... | | | ... |
| 140 | 140 | 210 | 129¼ | 136 | 115 | 22,700 | 264,140 | National Lead | 100 | 309,831 | 5% | 1928 | 11.45 | 8.40 |
| ... | ... | ... | ... | ... | ... | 5,200 | 160,200 | Newport Co. | 50 | 130,000 | 3.00 | 6 mo. | 5.47 | 5.55 |
| 29 | 28½ | 60⅞ | 22 | 41½ | 22⅝ | 40,300 | 698,400 | Penick & Ford | No | 433,773 | ... | 9 mo. | 2.96 | 3.15 |
| 240 | 215 | 404 | 208 | 217 | 157 | 2,700 | 182,700 | Peoples Gas Chi | 100 | 566,000 | 8% | | 11.67 | 11.92 |
| 23 | 23 | 45 | 20 | 9¾ | 6¼ | 5,400 | 2,269,800 | Spencer Kellogg | No | 500,000 | 1.60 | | 3.59 | 2.37 |
| 48⅛ | 47¼ | 94 | 38½ | 71½ | 37 | 61,400 | 652,300 | St Joseph Lead | 10 | 1,952,000 | 2.00 | 6 mo. | 2.22 | 2.96 |
| 64 | 62½ | 83 | 48 | 59⅝ | 37¾ | 1,099,000 | 13,409,100 | Standard Oil Co. of N. J. | 25 | 24,835,000 | 1.00 | 1928 | 4.43 | 1.52 |
| 35½ | 35 | 48⅛ | 31¾ | 45½ | 28¾ | 238,100 | 6,959,800 | Standard Oil Co. of N. Y. | 25 | 17,364,000 | 1.60 | 1928 | 2.28 | 0.67 |
| 12¼ | 11¾ | 20⅞ | 9½ | 19¾ | 10½ | 45,900 | 1,105,800 | Tenn. Cop. & Chem. | No | 857,000 | 1.00 | 1928 | 1.48 | 0.51 |
| 57¾ | 55¼ | 85¼ | 42½ | 82½ | 62½ | 317,400 | 4,024,900 | Texas Gulf Sulfur | No | 2,540,000 | 4.00 | 9 mo. | 4.52 | 5.72 |
| 78 | 75⅝ | 140 | 59 | 209 | 186½ | 675,900 | 5,960,700 | Union Carbide | No | 9,200,000 | 2.40 | 9 mo. | 2.89 | 3.71 |
| 139¾ | 134 | 243⅜ | 95 | 138 | 102½ | 216,600 | 2,013,300 | U. S. Ind. Alc. | No | 373,000 | 6.00 | 6 mo. | 5.30 | 10.29 |
| ... | ... | ... | ... | 125⅞ | 118⅝ | | 860 | pfd. | 100 | 60,000 | | | | 36.03 |
| 52⅞ | 51⅛ | 116½ | 37½ | 111½ | 60 | 78,600 | 1,851,800 | Vanadium Corp. | No | 378,000 | 3.00 | 6 mo. | 3.13 | 4.53 |
| 6 | 5½ | 24¾ | 3½ | 20⅝ | 12 | 44,500 | 660,800 | Virginia Car. com. | No | 479,000 | ... | | | 0.69 |
| 29 | 28½ | 65½ | 13 | 64¼ | 44⅝ | 22,500 | 158,420 | 6% pfd. | 100 | 213,392 | ... | | 3.06 | d7.57 |
| 26 | 25¼ | 97½ | 25¼ | 99½ | 88½ | 8,610 | 27,510 | 7% pfd. | 100 | 144,000 | 7% | | 12.35 | d20.09 |
| | | | | | | | | NEW YORK CURB | | | | | | |
| ... | ... | ... | ... | 31½ | 16½ | 3,800 | 39,400 | Acetol Prod. | No | 60,000 | | 1928 | 2.27 | |
| 19⅞ | 19⅝ | 43½ | 15 | 42⅝ | 33¼ | 4,100 | 51,800 | Agfa Ansco | No | 300,000 | ... | | | |
| 236 | 236 | 539½ | 146 | 197¾ | 120 | 11,500 | 106,150 | Aluminum Co. of America | No | 1,472,625 | ... | 1928 | 8.03 | 5.00 |
| 107½ | 107 | 108½ | 103 | 110¼ | 104 | 3,400 | 33,900 | pfd. | 100 | 1,472,625 | 6% | 1928 | 14.04 | 10.26 |
| 29⅝ | 27¾ | 69½ | 20½ | 65 | 30¾ | 377,300 | 2,066,975 | Amer. Cyan. | No | 66,000 | 1.60 | | 1.56 | †3.68 |
| ... | ... | 40⅞ | 10⅛ | 28¼ | 11⅝ | 3,000 | 173,200 | Amer. Sol. & Chem. com | No | 160,000 | ... | 1928 | 1.69 | 0.07 |
| 30½ | 30½ | 42½ | 25⅛ | 47⅞ | 25¼ | 2,400 | 84,800 | pfd. | No | 113,000 | ... | | | |
| 21½ | 21⅛ | 45¾ | 15 | 54 | 26½ | 15,600 | 185,500 | Anglo Chile Nitrate | No | 1,756,750 | ... | | | ... |
| 5 | 4½ | 10⅜ | ½ | 33⅜ | 7 | 15,100 | 146,900 | Br. Celanese | 108 | 2,200,000 | ... | | | ... |
| 14 | 13 | ... | ... | 46½ | 41 | | 1,400 | Canad. Ind. Alc. | No | 969,000 | 1.52 | 1928 | †2.87 | †2.49 |
| ... | ... | 57⅞ | 20 | 103 | 36½ | 13,300 | 144,400 | Celanese Corp. of Am | No | 1,000,000 | ... | 1928 | 0.67 | 1.72 |
| 17½ | 16½ | 50 | 12 | 122 | 34 | 4,500 | 10,000 | Celluloid Co. | No | 194,952 | ... | 1928 | 1.29 | 0.86 |
| 58 | 57⅝ | 90 | 40 | 92 | 75 | 8,500 | 123,000 | Colgate-Palmolive Peet | | 2,000,000 | 2.00 | 1928 | 2.65 | 2.10 |
| 15¼ | 15¼ | 25½ | 12 | ... | ... | 3,000 | 52,100 | Courtaulds | £1 | 24,000,000 | | 1928 | 19.88% | 34.88% |
| | | | | 24⅞ | 20 | | | Am. dep-rects. | ... | ... | ... | | | -- |

| 1929 Nov. 27 High | Low | 1929 High | Low | 1928 High | Low | Sales In Nov. | Since Jan. 1 | ISSUES | Par $ | Shares Listed | An. Rate | Earnings $-per share-$ 1929-1928 | 1927 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ... | ... | 41½ | 17⅜ | 23 | 7½ | 1,400 | 18,800 | Heyden Chem. | 10 | 150,000 | ... | 1928 2.02 | 1.02 |
| 7 | 7 | 11⅛ | 6⅜ | ... | ... | 2,400 | 5,000 | Imperial Chem. Ind. | £1 | 3,364,000 | | 1928 26.70% | 25.36% |
| ... | ... | ... | ... | 98 | 38½ | | 2,200 | Monroe Chem. | No | 100,000 | 1.50 | 6 mo. 0.98 | |
| ... | ... | ... | ... | ... | ... | 325 | 700 | Penn Salt | 50 | 150,000 | 5.00 | 1928 8.27 | 8.09 |
| ... | ... | 10⅝ | .6½ | 9⅜ | 6½ | 6,200 | 55,900 | Pyrene Mfg. | 10 | 219,470 | .80 | 1928 1.00 | 0.70 |
| ... | ... | ... | ... | ... | ... | 525 | 7,475 | Sherwin Williams | 25 | 594,445 | 4.00 | 6.99 | 6.42 |
| 15½ | 15½ | 48½ | 15 | 111½ | 103 | 20,000 | 549,300 | Silica Gel | No | 600,000 | ... | | |
| ... | ... | ... | ... | 92 | 65½ | 1,100 | 2,600 | Snia Viscosa | 200 lire | 8,333,333 | ... | 1928 7.22% | 2.01% |
| 2⅞ | 2⅞ | 5⅞ | 2⅜ | 29 | 17 | 100 | 100 | dep-recpts | ... | ... | ... | | ... |
| 138¾ | 132⅛ | 149⅞ | 121½ | 10 | 5½ | 4,650 | 47,850 | Swift & Co. | 100 | 1,500,000 | 8% | 1928 9.29 | 8.13 |
| 160 | 151 | 550 | 111 | 42 | 31½ | 3,985 | 28,120 | Tubize "B" | No | 78,858 | 10.00 | | |
| 34 | 34 | 61½ | 29½ | 150½ | 125 | 2,200 | 94,800 | United Chem., pfd. | 50 | 120,000 | 3.00 | | |
| ... | ... | 17½ | 17½ | 630 | 450 | 100 | 151,840 | com. | No | 102,000 | | | |
| ... | ... | 91⅝ | 36½ | 100 | 53⅜ | 1,040 | 284,840 | U. S. Gypsum | 20 | 760,000 | 1.60 | 6 mo. 2.69 | 7.21 |
| ... | ... | ... | ... | ... | ... | | 21,550 | Westvaco Chlorine Prod. | No | 200,000 | 2.00 | 3.60 | |
| | | | | | | | | **CLEVELAND** | | | | | |
| | | 98¾ | 94 | 147½ | 104 | 134 | 24,506 | Cleve-Cliff Iron | No | 400,000 | 4.00 | | 9.74 |
| 68½ | 68½ | 80 | 60 | 225 | 112½ | 1,041 | 3,018 | Dow Chem. | No | 1,000,000 | 6.00 | | |
| 101½ | 101½ | 107½ | 100 | 107 | 103⅜ | 326 | 1,110 | pfd. | 100 | 30,000 | 7% | | |
| ... | ... | ... | ... | ... | ... | | | Glidden | No | 500,000 | 2.00 | 3.37 | 2.88 |
| ... | ... | ... | ... | 104⅜ | 96 | | 2,865 | prior pfd. | 100 | 69,167 | 7% | 9 mo. 26.46 | 32.69 |
| ... | ... | 105 | 75 | 95 | 65½ | 1,733 | 20,864 | Sherwin Williams | 25 | 594,445 | 3.00 | 1928 6.99 | 6.42 |
| 104 | 104 | 108 | 103 | 109½ | 106 | 686 | 6,856 | pfd. | 100 | 125,000 | 6% | 39.21 | 37.82 |
| ... | ... | ... | ... | 28 | 24⅜ | | 2,569 | Wood Chemical Prod. "A" | No | 20,000 | 2.00 | | 7.75 |
| | | | | | | | | **CHICAGO** | | | | | |
| | | 26½ | 12 | 96 | 91½ | 800 | 22,450 | Monroe Chem. | 100 | 100,000 | 1.50 | 6 mo. 0.98 | 0.76 |
| ... | ... | ... | ... | 146 | 127½ | 100 | 75, 72 | Monsanto Chem. | No | 311,000 | 1.25 | 6 mo. 5.13 | 7.52 |
| 139 | 132 | 145 | 123 | ... | .. | 10,800 | 95,850 | Swift & Co. | 100 | 1,500,000 | 8% | 1928 9.87 | 8.13 |
| 44 | 43 | 92½ | 35 | ... | ... | 40,670 | 471,500 | U. S. Gypsum | 20 | 812,000 | 1.60 | 6 mo. 2.69 | 7.21 |
| 13 | 12⅜ | ... | ... | 100 | 55 | | 67,150 | United Chemicals, pfd. | No | 120,000 | 3.00 | 1.57 | |
| | | | | | | | | **CINCINNATI** | | | | | |
| 58½ | 58 | ... | ... | 300 | 249 | 33,980 | 106,02 | Proc. & Gam. | 20 | 1,250,000 | 8.00 | 11.96 | 11.38 |
| | | | | | | | | **PHILADELPHIA** | | | | | |
| ... | ... | 116 | 89 | 109½ | 92 | 9,900 | 41,600 | Penn. Salt | 50 | 150,000 | 5.00 | 10.64 | 8.27 |
| 30½ | 29½ | 59⅜ | 26 | 173½ | 114½ | 745,000 | 3,569,028 | United Gas Imp. | No | 3,999,000 | 1.00 | 1928 1.36 | 0.67 |
| | | | | | | | | **MONTREAL** | | | | | |
| ... | ... | ... | ... | ... | ... | 1,816 | 41,073 | Asbestos Corp. | No | 200,000 | ... | | 0.87 |
| 12 | 10 | ... | ... | ... | ... | 355 | 11,910 | pfd. | 100 | 75,000 | 7% | 1928 3.36 | 9.32 |
| 13½ | 13 | ... | ... | ... | ... | 33,515 | 250,147 | Canada Ind. Alc. | No | 969,000 | 1.52 | 1928 †2.87 | †2.49 |
| 75½ | 75 | ... | ... | .. | ... | 46,990 | 700,293 | Shawinigan W. & P. | No | 2,178,000 | 2.00 | 1928 2.17 | 2.41 |
| | | | | | | | | **BALTIMORE** | | | | | |
| ... | ... | ... | ... | 28⅜ | 17 | | 1000 | Silica Gel | No | 630,000 | ... | | |
| | | | | | | | | **UNLISTED** | | | | | |
| ... | ... | ... | ... | 80 | 70 | | | Agfa Ansco, pfd. | 100 | 50,500 | ... | | ... |
| ... | ... | ... | ... | 375 | 190 | | | Hercules Powd., com. | No | 147,000 | 14% | 9 mo. 15.10 | 16.36 |
| 72 | 65 | ... | ... | 82 | 64 | | | Merck. & Co., pfd. | 100 | 33,950 | ... | | ... |

# *The Industry's Bonds*

| 1929 Nov. 27 High | Low | 1929 High | Low | 1928 High | Low | Sales In Nov. | Since Jan. 1 | ISSUE | Date Due | Int. % | Int. Period | Orig. (1 Offering $ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | **NEW YORK STOCK EXCHANGE** | | | | |
| 103½ | 103½ | 106½ | 103½ | 106⅜ | 104 | 159 | 1,114 | Am. Agri Chem. | 1941 | 7½ | F. A. | 30,000 |
| 98⅞ | 98½ | 98¾ | 93¾ | 97 | 92 | 110 | 1,395 | Amer. Cyanid | 1942 | 5 | A. O. | |
| 105¾ | 104½ | 135 | 95 | ... | ... | 1,165 | 5,057 | Amer. I. G. Chem. | | | | |
| 101 | 101 | 102 | 98 | 102⅜ | 99⅜ | 354 | 3,017 | Am. Smelt & Refin "A" 5% | 1947 | 5 | A. O. | ... |
| 88 | 88 | 100 | 79 | 105½ | 92 | 272 | 2,869 | Anglo Chilean | 1945 | 7 | M. N. | 16,500 |
| 102½ | 102½ | 103½ | 99⅜ | 103¾ | 99⅜ | 192 | 1,398 | Atlantic Refin. | 1937 | 5 | J. J. | 15,000 |
| 101½ | 100⅞ | 102 | 98¼ | 103½ | 100 | 78 | 365 | By product Coke | 1945 | 5½ | M. N. | 8,000 |
| 102 | 100¾ | 103 | 96½ | 103⅜ | 100 | 14 | 97 | Corn Product Refin. | 1934 | 5 | M. N. | 10,000 |
| ... | ... | ... | ... | 117 | 106 | | 781 | General Asphalt | 1939 | 6 | A. O. | 5,000 |
| 93½ | 93½ | 95 | 90½ | 95⅜ | 89½ | 6 | 196 | Int. Agric. Corp. | 1932 | 5 | M. N. | 30,000 |
| 72¼ | 72¼ | 81½ | 72 | 86¼ | 77 | 16 | 169 | Int. Agri. Corp. stamped. extended | 1942 | 5 | M. N. | 7,020 |
| ... | ... | 104 | 82 | ... | ... | 583 | 3,635 | Lautaro Nitrate | | | | |
| 106 | 102½ | 127 | 100½ | ... | ... | 106 | 1,639 | Montecatini | 1937 | 7 | J. J. | |
| ... | ... | 99¼ | 93 | ... | ... | 80 | 1,749 | Ex War | 1937 | 7 | J. J. | |
| 113 | 111 | 113 | 110 | ... | ... | 3 | 93 | People's Gas & Coke | 1943 | 6 | A. O. | 10,000 |
| 101⅜ | 101¼ | 105¾ | 100½ | 108⅜ | 102 | 96 | 791 | Refunding | 1947 | 5 | M. S. | 40,000 |
| 102 | 101½ | 103⅜ | 100 | 104 | 102 | 941 | 6,021 | Standard Oil N. J. | 1946 | 5 | F. A. | 120,000 |
| 96⅜ | 96½ | 100 | 88 | 120 | 101½ | 212 | 1,088 | Tenn. Cop. and Chem. | 1941 | 6 | A. O. | 3,000 |
| 73 | 69¼ | 82 | 68⅞ | 91⅞ | 82 | 3 | 127 | Va. Iron C. & C. | 1949 | 5 | M. S. | |
| | | | | | | | | **NEW YORK CURB** | | | | |
| | | | | 103½ | 100 | 214 | 601 | Alum. Co. of Am 52 | 1952 | 5 | M. S. | |
| 102 | 101¾ | 102½ | 99⅜ | 121½ | 98 | | 2,357 | Amer. Com. Alc. | 1943 | 5 | M. N. | |
| ... | ... | ... | ... | 125 | 99 | 13 | 1,653 | Amer. Solv. & Chem. | 1936 | 6 | M. S. | |
| ... | ... | 125 | 99⅞ | 101⅜ | 97½ | 250 | 2,823 | Koppers Gas and Coke | 1947 | 5 | J. D. | 25,000 |
| 96½ | 96 | 100½ | 93 | 103¼ | 98 | | 343 | Natl. Dist. Prod. | 1935 | 6½ | J. D. 15 | 3,500 |
| 94½ | 94½ | 94¾ | 88½ | 98¾ | 93½ | 115 | 1,574 | Shawinigan W & P | 1967 | 4½ | A. O. | |
| ... | ... | ... | ... | 106⅜ | 100 | 47 | 602 | Silica Gel. 6½% with warr. | 1952 | 6½ | | |
| ... | ... | ... | ... | 100 | 95 | 33 | 2,616 | Solvay Am. Invest. Corp. | 1942 | 5 | M. S. | 15,00 |
| 99⅜ | 99½ | 100½ | 98 | 101½ | 99⅜ | 253 | 699 | Swift & Co. | 1932 | 5 | A. O. | 50,00 |
| ... | .... | 104 | 98 | 104 | 99⅜ | 29 | 475 | Westvaco Chlorine Prod. | 1937 | 5½ | M. S. | 2,50 |

# The Trend of Prices

## Past Month's Industrial Activity Well Ahead of Last November

**Production, However, Declined Further From Unusually High Peak Reached During Middle of Year—Contract Renewals On Soda Ash and Caustic Indicate Complete Confidence of Business—From Two to Three Per Cent Ahead of Last Year—Solvent Group Off.**

Although the level of industrial activity declined somewhat further from the unusually high point of production volume reached during the middle of this year, production during the past month was well ahead of November of last year.

Attention was directed in the statement of the Federal Reserve Board to the fact that the recession shown during the last several months was from an unusually high point of production volume that was reached near the middle of the current year. This level was "substantially higher" than the high point of 1928, and thus the new level created was above the volume for the corresponding period of the preceding year.

Industrial production declined further in October, and there was also a decrease in factory employment. As compared with a year ago, industrial activity continued to be at a higher level, and distribution of commodities to the consumer was sustained. Bank credit outstanding increased rapidly in the latter part of October, when security prices declined abruptly and there was a large liquidation of broker's loans by non-banking lenders. In the first three weeks of November further liquidation of brokers' loans was reflected in a reduction of security loans of member banks. Money rates declined throughout the period.

Production in basic industries, which had declined for several months from the high level reached in midsummer, showed a further reduction in October. The Board's index of industrial production decreased from 121 in September to 117 in October, a level to be compared with 114 in October of last year.

The decline in production reflected chiefly further decreases in output of steel and automobiles. Daily average output of shoes, leather, and flour also declined, while production of cotton and wool textiles increased. Preliminary reports for the first half of November indicate further reduction in output of steel and automobiles, and a decrease in cotton textiles.

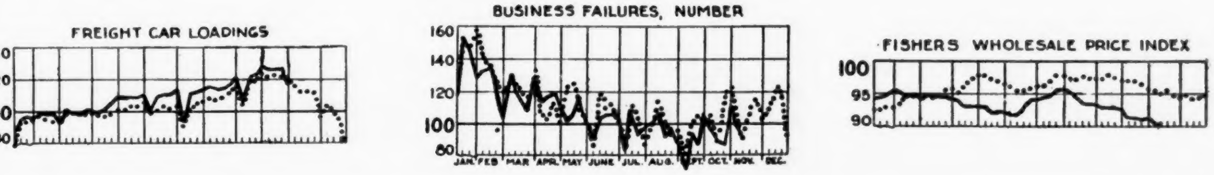
Total output of minerals showed little change. Production of coal increased, and copper output was somewhat larger, while daily output of crude petroleum declined slightly for the month of October and was further curtailed in November.

Volume of construction, as measured by building contracts awarded, changed little between September and October and declined in the early part of November.

Shipments of freight by rail decreased slightly in October and the first two weeks in November on an average daily basis. Department store sales continued as in other recent months to be approximately 3 per cent larger than a year ago.

The general level of wholesale prices showed little change during the first three weeks of October, but in the last week of the month declined considerably. The decline reflected chiefly price reductions of commodities with organized exchanges, which were influenced by the course of security prices. During the first three weeks of November prices for most of these commodities recovered from their lowest levels. Certain prices, particularly those of petroleum, iron and steel, and coal, showed little change during the period.

Chemical business during the past month has given every indication that industry generally is proceeding on its uninterrupted course of activity with complete confidence. Contract renewals on soda ash and caustic, two of the most reliable indicators of general business conditions, have been proceeding at a great rate and for the month are reported as being from two to three per cent ahead of November of last year. As a group, those chemicals going to the lacquer industry are off to a considerable extent, but this is largely seasonal and an improvement may be looked for as soon as automobile producers begin work on new models. But aside from this outstanding exception, chemical business is reported as proceeding in good shape for this season of the year. Deliveries and shipments continue to go forward as usual under contract, with no sign of curtailment except in the cases noted.




*Business indicators prepared by the Department of Commerce. The weekly average 1923-35 inclusive = 100. The solid line represents 1929 and the dotted line 1928.*

# Prices Current

*Heavy Chemicals, Coaltar Products, Dye-and-Tanstuffs, Colors and Pigments, Fillers and Sizes, Fertilizer and Insecticide Materials, Naval Stores, Fatty Oils, etc.*

**Chemical prices quoted** are of American manufacturers for spot New York, immediate shipment, unless otherwise specified. Products sold f. o. b. works are specified as such. Imported chemicals are so designated. Resale stocks when a market factor are quoted in addition to makers' prices and indicated "second hands."

**Oils** are quoted spot New York, ex-dock. Quotations f.o.b. mills, or for spot goods at the Pacific Coast are so designated.

**Raw materials** are quoted New York, f. o. b., or ex-dock. Materials sold f. o. b. works or delivered are so designated.

**The current range** is not "bid and asked," but are prices from different sellers, based on varying grades or quantities or both. Containers named are the original packages most commonly used.

**Purchasing Power of the Dollar: 1926 Average--$1.00 - Jan. 1927 $1.042 - Jan. 1928 $1.047 - Nov. 1929 $1.076**

**Acetone** — Although the same condition of plentiful stocks in the hands of producers continues to prevail, there has been no further decline in prices and in some quarters the market is reported as being steadier. The chief difficulty of course has been the fact that demand has fallen off to such an extent that even the new low prices announced a month ago failed to stimulate business to any great extent. However, most factors look for improvement with the turn of the year when it is thought that automobile production will once more reach normal levels. Meantime it is pointed out that the solvent market generally is in firm position as there are no stocks in the hands of consumers and that when demand does start it will come in considerable volume.

**Acid Acetic** — Although supplies of acetate of lime are still at a premium, producers of acetic acid are now well able to satisfy all demands, since the total does not come to any such volume as has prevailed during the past nine months. Demands from both the lacquer and the textile users have fallen away considerably, and producers are taking advantage of the lull to build up their stocks which had become unusually low.

**Acid Boric** — During the past month, producers have increased prices ¼c lb., thus marking the cessation of price competition and the return of normal and steady conditions to this market. Business is reported as being very active in this material as prevailing low prices have encouraged wider uses.

**Acid Chromic** — Continues in good demand from plating industry with prices well maintained at current levels and considerable arrivals of imported material noted.

**Acid Nitric** — In common with the other mineral acids, nitric has been in very firm position with contract renewals at current price levels coming in in good volume.

**Acid Oxalic** — Continued scantiness of this material is reported from all quarters as production is all sold up and producers are making every effort to meet the tremendous demand from the coal industry. As an indication of the scarcity here, it is interesting to note the extra-

| 1928 High | 1928 Low | 1927 High | 1927 Low | | Current Market | | 1929 High | 1929 Low |
|---|---|---|---|---|---|---|---|---|
| .26 | .18½ | .24 | .24 | Acetaldehyde, drs lc-1 wks...lb. | .18½ | .21 | .21 | .18½ |
| | | | | Acetaldol, 50 gal dr..........lb. | .27 | .31 | .31 | .27 |
| .24 | .23 | .20 | .20 | Acetanilid, tech, 150 lb bbl...lb. | .23 | .24 | .24 | .23 |
| .35 | .29 | .29 | .29 | Acetic Anhydride, 92-95%, 100 lb cbys..................lb. | .29 | .35 | .35 | .29 |
| ..... | ..... | .38 | .32 | Acetin, tech drums..........lb. | .30 | .32 | .32 | .30 |
| .15 | .13 | .12 | .12 | Acetone,... :..............lb. | .12 | 14 | .16 | 12 |
| 1.75 | 1.65 | 1.65 | 1.65 | Acetone Oil, bbls NY.......gal. | 1.15 | 1.25 | 1.25 | 1.15 |
| .45 | .42 | .42 | .42 | Acetyl Chloride, 100 lb cby...lb. | .55 | .68 | .68 | .45 |
| | | | | Acetylene Tetrachloride (see tetrachlorethane)............. | | | | |
| | | | | **Acids** | | | | |
| 3.88 | 3.38 | 3.38 | 3.38 | Acid Acetic, 28% 400 lb bbls c-1 wks.............100 lb. | ..... | 3.88 | 3.88 | 3.88 |
| 13.68 | 11.92 | 11.92 | 11.92 | Glacial, bbl c-1 wk.....100 lb. | ..... | 13.68 | 13.68 | 13.68 |
| 1.00 | .98 | .98 | .98 | Anthranilic, refd, bbls........lb. | .98 | 1.00 | 1.00 | .98 |
| .80 | .80 | .80 | .80 | Technical, bbls............lb. | ..... | .80 | .80 | .80 |
| 2.25 | 1.60 | 1.60 | 1.25 | Battery, cbys...........100 lb. | 1.60 | 2.25 | 2.25 | 1.60 |
| .60 | .57 | .57 | .57 | Benzoic, tech, 100 lb bbls....lb. | .57 | .60 | .60 | .57 |
| .11 | .08½ | .08½ | .08½ | Boric, crys. powd, 250 lb. bbls..................lb. | .06½ | .07½ | .07½ | .05½ |
| 1.25 | 1.25 | 1.25 | 1.25 | Broenner's, bbls.............lb. | ..... | 1.25 | 1.25 | 1.25 |
| .90 | .85 | .85 | .80 | Butyric, 100% basis cbys.....lb. | .85 | .90 | .90 | .85 |
| 4.85 | 4.85 | 4.90 | 4.85 | Camphoric...................lb. | ..... | 5.25 | 5.25 | 4.85 |
| .28 | .13 | .25 | .25 | Carbolic, 10%, 50 gal bbls....lb. | .13 | .14 | .14 | .13 |
| .16 | .15 | .15 | .15 | Chlorosulfonic, 1500 lb drums wks....................lb. | .04½ | .05½ | .05½ | .04½ |
| .30 | .25 | .37 | .25 | Chromic, 99%, drs extra.....lb. | .17½ | .19 | .23 | .17½ |
| 1.06 | 1.00 | 1.00 | 1.00 | Chromotropic, 300 lb bbls....lb. | 1.00 | 1.06 | 1.06 | 1.00 |
| .44½ | .59 | .44½ | .43 | Citric, USP, crystals, 230 lb. bbls..................lb. | .46 | .59 | | .46 |
| .97 | .95 | .95 | .95 | Cleve's, 250 lb bbls..........lb. | .52 | .54 | .59 | .52 |
| .70 | .68 | .60 | .57 | Cresylic, 95%, dark drs NY..gal. | .60 | .70 | .54 | .60 |
| .72 | .72 | .70 | .60 | 97-99%, pale drs NY.....gal. | .72 | .77 | .77 | .72 |
| .12 | .11 | .11 | .10 | Formic, tech 90%, 140 lb. cby....................lb. | .11½ | .11½ | .11½ | .10½ |
| .55 | .50 | .50 | .50 | Gallic, tech, bbls............lb. | .50 | .55 | .12 | .50 |
| .74 | .74 | .74 | .69 | USP, bbls................lb. | ..... | .74 | .55 | .74 |
| 1.06 | 1.00 | 1.00 | 1.00 | Gamma, 225 lb bbls wks.....lb. | .80 | .85 | .74 | .74 |
| .63 | .57 | .57 | .57 | H, 225 lb bbls wks..........lb. | .65 | .70 | .99 | .80 |
| .67 | .67 | .67 | .65 | Hydriodic, USP, 10% soln cby lb. | ..... | .67 | .72 | .67 |
| .48 | .45 | .45 | .45 | Hydrobromic, 48%, coml, 155 lb cbys wks............lb. | .45 | .48 | .67 .48 | .45 |
| | | | | Hydrochloric, CP, see Acid Muriatic.................. | | | ..... | ..... |
| .90 | .80 | .80 | .80 | Hydrocyanic, cylinders wks...lb. | .80 | .90 | .90 | .80 |
| .06 | .06 | .06 | .06 | Hydrofluoric, 30%, 400 lb bbls wks....................lb. | ..... | .06 | .06 | .06 |
| .11 | .11 | .11 | .11 | Hydrofluosilicic, 35%, 400 lb bbls wks..............lb. | ..... | .11 | .11 | .11 |
| .85 | .85 | .85 | .85 | Hypophosphorous, 30%, USP, demijohns..............lb. | ..... | .85 | .85 | .85 |
| .06 | .04½ | .05½ | .05½ | Lactic, 22%, dark, 500 lb bbls lb. | .04½ | .05 | .05½ | .04½ |
| .13½ | .12 | .13 | .13 | 44%, light, 500 lb bbls......lb. | .11 | .11½ | .12½ | .11 |
| .54 | .52 | .52 | .52 | Laurent's, 250 lb bbls........lb. | .40 | .42 | .42 | .40 |
| .60 | .48 | ..... | ..... | Malic, powd., kegs...........lb. | .48 | .60 | .60 | .48 |
| .65 | .60 | .60 | .60 | Metanilic, 250 lb bbls........lb. | .60 | .65 | .65 | .60 |
| | | | | Mixed Sulfuric-Nitric.......... | | | | |
| .08 | .07½ | .07½ | .07½ | tanks wks..........N unit | .07 | .07½ | .07½ | .07 |
| .01½ | .01 | .01 | .01 | tanks wks..........S unit | .008 | .01 | .01 | .008 |
| .21 | .18 | .21 | .18 | Monochloroacetic, tech bbl..lb. | .18 | .21 | .21 | .18 |
| .65 | .65 | 1.65 | 1.65 | Monosulfonic, bbls..........lb. | 1.65 | 1.70 | 1.70 | 1.65 |
| 1.40 | 1.35 | 1.35 | 1.35 | Muriatic, 18 deg, 120 lb cbys c-1 wks.............100 lb. | ..... | 1.35 | 1.40 | 1.35 |
| | | | | tanks, wks. 100 lb. | | 1.00 | 1.00 | 1.00 |
| 1.80 | 1.70 | 1.70 | 1.70 | 20 degrees, cbys wks...100 lb. | ..... | 1.45 | .... | 1.45 |
| .95 | .85 | .95 | .95 | N & W, 250 lb bbls........... | .85 | .95 | .95 | .85 |
| .59 | .55 | .55 | .55 | Naphthionic, tech, 250 lb....... | ..... | Nom. | .59 | .55 |
| 5.00 | 5.00 | 5.00 | 5.00 | Nitric, 36 deg, 135 lb cbys c-wks................100 lb. | ..... | 5.00 | 5.00 | 5.00 |
| 6 00 | 6.00 | 6.00 | 6.00 | 40 deg, 135 lb cbys, c-1 wks................100 lb. | ..... | 6.00 | 6.00 | 6.00 |
| .11½ | .10½ | .11½ | .11 | Oxalic, 300 lb bbls wks NY...lb. | .11½ | .11½ | .11½ | .11 |
| .08½ | .08 | .08 | .07 | Phosphoric 50%, 150 lb cby..lb. | .08 | .08½ | .08½ | .08 |
| .16 | .16 | .19 | .16 | Syrupy, USP, 70 lb drs....lb. | ..... | .16 | .16 | .16 |
| .50 | .50 | .50 | .50 | Picramic, 300 lb bbls........lb. | .65 | .70 | .70 | .65 |
| .50 | .40 | .45 | .30 | Picric, kegs.................lb. | .40 | .50 | .50 | .40 |
| .86 | .86 | .86 | .86 | Pyrogalic, technical, 200 lb bbls..................lb. | ..... | .86 | .86 | .86 |
| .32 | .27 | .27 | .27 | Salicylic, tech, 125 lb bbl.....lb. | .37 | .42 | .42 | .37 |
| .16 | .15 | .15 | .15 | Sulfanilic, 250 lb bbls........lb. | .15 | .16 | .16 | .15 |
| 1.95 | 1.60 | 1.60 | 1.60 | Sulfuric, 66 deg, 180 lb cbys lc-1 wks............100 lb. | 1.60 | 1.95 | 1.95 | 1.60 |
| | | | | tanks, wks. ton | | 15.50 | 15.50 | 15.50 |
| 1.37½ | 1.20 | 1.20 | 1.20 | 1500 lb dr wks......100 lb. | 1.50 | 1.65 | 1.65 | 1.50 |
| 1.12½ | 1.12½ | 1.10 | 1.10 | 60°, 1500 lb dr wks....100 lb. | 1.27½ | 1.42½ | 1.42½ | 1.27½ |
| 1.52½ | 1.52½ | 1.50 | 1.50 | Oleum, 20%, 1500 lb. drs lc-1 wks ...... .........100 lb. | ..... | 1.52½ | 1.52½ | 1.52½ |

# Prices Current and Comment

**Purchasing Power of the Dollar: 1926 Average--$1.00 - Jan. 1927 $1.042 - Jan. 1928 $1.047 - Nov. 1929 $1.076**

ordinarily heavy imports, which have been increasing by leaps and bounds since the middle of the year. This is not a normal condition or tendency, for the trend is towards a definite disappearance of foreign material from this market. Although the present emergency is merely a temporary one which will be removed as soon as present accumulated stocks of coal have been treated, is has resulted in a strong revival of imported material in the domestic market.

**Acid Sulfuric** — Continues firm and in good demand. All factors are optimistic concerning contracts for next year, expecting a larger volume of business than ever at currently prevailing prices.

**Alcohol** — Although the anti-freeze demand was rather delayed, the past month saw it open in convincing fashion, with the result that producers are all inclined to regard the coming season favorably. Butyl alcohol was suffering from the let-down prevalent in the lacquer field. This is largely seasonal, however, although this year it is being felt to a greater extent than was true of the same period last year. But some improvement in the automobile industry is expected with the turn of the year and it is felt that conditions in this market will improve at that time.

**Ammonia** — Although the contract season had barely opened, producers reported that first returns gave every evidence of being entirely satisfactory. It was also announced during the past month that effective January 1, prices on anhydrous would be advanced 1½c lb. This will establish the market in New York at 15½c lb. The usual additional 6c lb. for 50 lb. cylinders will be charged and the advance will be general throughout the country resulting in from 1c lb. to 2c lb. increase throughout the country.

**Ammonium Chloride** — The modern radio is beginning to make itself felt inasmuch as battery sets are definitely declining and thus cutting consumption of this material. This has been expected but this past month is the first which has shown a definite decline as compared with previous figures on demand for similar periods.

**Ammonium Sulfate** — In common with most of the fertilizer group except sodium nitrate, has been characterized by lack of activity and slack demand thus far during the season. Prices have continued unchanged but off-season conditions prevail.

**Antimony** — Has been characterized by lack of demand and a very quiet mar-

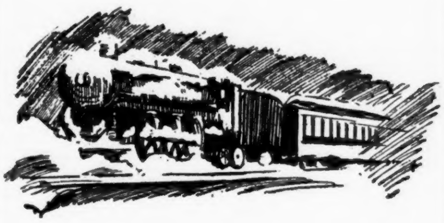
| 1928 High | 1928 Low | 1927 High | 1927 Low | | Current Market | 1929 High | 1929 Low |
|---|---|---|---|---|---|---|---|
| 42.00 | 42.00 | 42.00 | 42.00 | 40%, lc-1 wks net .......ton | ..... | 42.00 | 42.00 | 42.00 |
| .40 | .30 | .30 | .30 | Tannic, tech, 300 lb bbls...lb. | .30 | .40 | .40 | .30 |
| .38 | .34½ | .37 | .29½ | Tartaric, USP, crys, powd, 300 lb. bbls.............lb. | .38 | .38½ | .38½ | .38 |
| .85 | .85 | .85 | .85 | Tobias, 250 lb bbls ........lb. | ..... | .85 | .85 | .85 |
| 2.75 | 2.75 | 2.75 | 2.00 | Trichloroacetic bottles......lb. | ..... | 2.75 | 2.75 | 2.75 |
| 2.00 | 2.00 | 2.00 | 2.00 | Kegs..................lb. | ..... | 2.00 | 2.00 | 2.00 |
| 1.25 | 1.00 | 1.00 | 1.00 | Tungstic, bbls.............lb. | 1.40 | 1.70 | 2.25 | 1.00 |
| .55 | .43 | .45 | .45 | Albumen, blood, 225 lb bbls..lb. | .43 | .47 | .47 | .43 |
| | | | | dark, ...............bbls., lb. | .12 | .20 | .20 | .12 |
| .84 | .78 | .96 | .80 | Egg, edible...............lb. | .74 | .77 | .83 | .70 |
| .80 | .70 | .92 | .77 | Technical, 200 lb cases ..lb. | .70 | .75 | .80 | .70 |
| .65 | .60 | .60 | .60 | Vegetable, edible..........lb. | .60 | 65 | .65 | .60 |
| .55 | .50 | .50 | .50 | Technical.............lb. | .50 | .55 | .55 | .50 |
| | | | | **Alcohol** | | | |
| .20 | .18¼ | .20 | .19 | Alcohol Butyl, Normal, 50 gal drs c-1 wks.............lb. | .17½ | .18¼ | .17¾ | .17¼ |
| .19½ | .18¾ | .20½ | .19½ | Drums, 1-c-1 wks........lb. | .17¾ | .18¾ | .18½ | .17¾ |
| .19 | .17¾ | .19¾ | .18½ | Tank cars wks..........lb. | .16¾ | .17¾ | .17½ | .16¾ |
| 2.25 | 1.75 | ..... | ..... | Amyl (from pentane) drs c-1 wks.............gal. | ..... | 1.67 | 1.67 | 1.67 |
| 1.80 | 1.70 | 1.70 | 1.70 | Diacetone, 50 gal drs del..gal. | 1.70 | 1.80 | 1.80 | 1.70 |
| 3.70 | 2.65 | 3.70 | 3.70 | Ethyl, USP, 190 pf, 50 gal bbls................gal. | ..... | 2.69½ | 2.69½ | 2.69½ |
| .55 | .50 | .50 | .50 | Anhydrous, drums........gal. | ..... | .71 | .71 | .71 |
| .52 | .48½ | .52 | .37½ | Completely denatured, No. 1, 190 pf, 50 gal drs drums extra..............gal. | ..... | .52 | .52 | .49 |
| .50 | .43 | .50 | .29 | No. 5, 188 pf, 50 gal drs. drums extra.........gal. | ..... | .51 | .51 | .48 |
| .46 | .41 | .46 | .25 | Tank, cars.............gal. | ..... | .49 | .49 | .46 |
| 1.25 | 1.00 | 1.00 | 1.00 | Isopropyl, ref, gal drs.....gal. | 1.05 | 1.30 | 1.30 | 1.00 |
| 1.00 | 1.00 | 1.00 | 1.00 | Propyl Normal, 50 gal dr..gal. | ..... | 1.00 | 1.00 | 1.00 |
| .82 | .80 | .80 | .80 | Aldehyde Ammonia, 100 gal dr lb. | .80 | .82 | .82 | .80 |
| .65 | .65 | .65 | .65 | Alpha-Naphthol, crude, 300 lb bbls...................lb. | ..... | .65 | .65 | .65 |
| .37 | .35 | .35 | .35 | Alpha-Naphthylamine, 350 lb bbls...................lb. | .32 | .34 | .34 | .32 |
| 3.30 | 3.25 | 3.25 | 3.15 | Alum Ammonia, lump, 400 lb bbls, lc-1 wks......100 lb. | 3.25 | 3.30 | 3.30 | 3.25 |
| 5.50 | 5.25 | 5.25 | 5.25 | Chrome, 500 lb casks, wks ...................100 lb. | 5.00 | 5.25 | 5.50 | 5.00 |
| 3.20 | 3.10 | 3.50 | 3.10 | Potash, lump, 400 lb casks wks...............100 lb. | 3.00 | 3.10 | 3.20 | 3.00 |
| 5.50 | 5.25 | 5.25 | 5.25 | Chrome, 500 lb casks wks ...................100 lb. | 5.25 | 5.50 | 5.50 | 5.25 |
| 3.75 | 3.75 | 3.75 | 3.75 | Soda, ground, 400 lb bbls wks...............100 lb. | ..... | 3.75 | 3.75 | 3.75 |
| 26.00 | 24.30 | 27.00 | 26.00 | Aluminum Metal, c-1 NY .100 lb. | ..... | 24.30 | 24.30 | 24.30 |
| .40 | .35 | .35 | .35 | Chloride Anhydrous, .....................lb. | .05 | .15 | .20 | .05 |
| .18 | .17 | .17 | .17 | Hydrate, 96%, light, 90 lb bbls...................lb. | .17 | .18 | .18 | .17 |
| .24 | .18 | .23 | .23 | Stearate, 100 lb bbls.......lb. | .25 | .26 | .26 | .25 |
| 1.75 | 1.75 | 1.75 | 1.75 | Sulfate, Iron, free, bags c-1 wks.............100 lb. | 1.95 | 2.05 | 2.05 | 1.95 |
| 1.40 | 1.40 | 1.40 | 1.35 | Coml, bags c-1 wks..100 lb. | ..... | 1.40 | 1.40 | 1.40 |
| 1.15 | 1.15 | 1.15 | 1.15 | Aminoazobenzene, 110 lb kegs lb. | ..... | 1.15 | 1.15 | 1.15 |
| | | | | **Ammonium** | | | |
| .14 | .13½ | .13½ | .10 | Ammonia, anhyd, 100 lb cyl..lb. | .14 | .14½ | .14½ | .14 |
| .03 | .03 | .03 | .02½ | Water, 26°, 800 lb dr del...lb. | ..... | .03½ | .03½ | .03½ |
| | | | | Bicarbonate, bbls., f.o.b. plant ...............100 lb. | ..... | 5.15 | 6.50 | 5.15 |
| .22 | .21 | .21 | .21 | Bifluoride, 300 lb bbls......lb. | .21 | .22 | .22 | .21 |
| .09 | .08¾ | .08¾ | .08¾ | Carbonate, tech, 500 lb cs..lb. | .09 | .12 | .12 | .09 |
| 5.15 | 4.45 | 5.05 | 4.85 | Chloride, white, 100 lb. bbls wks..............100 lb. | 4.45 | 5.15 | 5.15 | 4.45 |
| 5.75 | 5.25 | .07 | .05½ | Gray, 250 lb bbls wks....lb. | 5.25 | 5.75 | 5.75 | 5.25 |
| .11½ | .11 | .11 | .11 | Lump, 500 lb cks spot...lb. | .11 | .11½ | .11½ | .11 |
| .16 | .15 | .15 | .15 | Lactate, 500 lb bbls........lb. | .15 | .16 | .16 | .15 |
| .10 | .06 | .06 | .06 | Nitrate, tech, casks........lb. | .06 | .10 | .10 | .06 |
| .38 | .27½ | .27½ | .27½ | Persulfate, 112 lb kegs.....lb. | .26 | .30 | .34 | .26 |
| .18 | .18 | .18 | .18 | Phosphate, tech, powd, 325 lb bbls...................lb. | .12½ | .13 | .13 | .12½ |
| 2.90 | 2.20 | 2.30 | 2.55 | Sulfate, bulk c-1.......100 lb. | 2.10 | 2.20 | 2.40 | 2.05 |
| 3.00 | 2.50 | 2.55 | 2.35 | Southern points.....100 lb. | 2.10 | 2.20 | 2.45 | 2.05 |
| 60.85 | 60.85 | 59.70 | 56.85 | Nitrate, 26% nitrogen 31.6% ammonia imported bags c. i. f.........ton | ..... | 53.50 | 60.85 | 52.40 |
| .60 | .55 | .55 | .55 | Sulfocyanide, kegs........lb. | .36 | .48 | .48 | .36 |
| 2.25 | 1.72 | 2.25 | 1.90 | Amyl Acetate, (from pentane) drs...................gal. | 1.60 | 1.70 | 1.70 | 1.60 |
| ..... | ..... | ..... | ..... | Tech., drs................lb. | .23 | .24 | .24 | .23 |
| | | | | Alcohol, see Fusel Oil........ | | | |
| | | | | Furoate, 1 lb tins.........lb. | | 5.00 | | |
| .16½ | .15½ | .15½ | .15 | Aniline Oil, 960 lb drs........lb. | .15½ | .16½ | .16½ | .15½ |
| .48 | .41 | .41 | .41 | Annatto, fine..............lb. | .34 | .37 | .37 | .34 |
| 1.00 | .90 | .90 | .90 | Anthraquinone, sublimed, 125 lb bbls...................lb. | .80 | .90 | .90 | .80 |
| .12 | .09½ | .11½ | .14 | Antimony, metal slabs, ton lots ......................lb. | ..... | .08¾ | .10 | .08¾ |
| .12 | .10 | .15½ | .14 | Needle, powd, 100 lb cs....lb. | ..... | .10 | .10 | .09 |
| .18 | .17 | .17 | .17 | Chloride, soln (butter of) cbys...................lb. | .17 | .18 | .18 | .17 |
| .12 | .09½ | .16½ | .16½ | Oxide, 500 lb bbls.........lb. | ..... | .08¾ | .10 | .08¾ |
| ..... | ..... | .28 | .25½ | Salt, 66%, tins............lb. | .25½ | .26 | .26 | .25½ |
| .20 | .16 | .20 | .16 | Sulfuret, golden, bbls......lb. | .16 | .20 | .20 | .16 |
| .42 | .38 | .42 | .37½ | Vermilion, bbls............lb. | .38 | .42 | .42 | .38 |
| .19 | .17 | .18 | .18 | Archil, conc, 600 lb bbls......lb. | .17 | .19 | .19 | .17 |
| .14 | .12 | .12 | .12 | Double, 600 lb bbls........lb. | .12 | .14 | .14 | .12 |
| .16 | .15 | .16 | .14 | Triple, 600 lb bbls........lb. | .15 | .16 | .16 | .15 |
| .08 | .08 | .15 | .12½ | Argols, 80%, casks..........lb. | ..... | .08 | .08 | .08 |
| .16 | .15 | .08 | .03 | Coude, 30%, casks.........lb. | .15 | .16 | .16 | .15 |
| .11 | .10½ | .10½ | .10½ | Arsenic, Red, 224 lb kegs, cs..lb. | .09 | .11 | .11 | .09 |
| .04 | .03½ | .04 | .03½ | White, 112 lb kegs.........lb. | .04 | .04½ | .04½ | .04 |
| 14.75 | 14.75 | 14.75 | 14.75 | Asbestine, c-1 wks..........ton | ..... | 15.00 | 15.00 | 4.75 |

# Prices Current and Comment

**Purchasing Power of the Dollar: 1926 Average--$1.00 - Jan. 1927 $1.042 - Jan. 1928 $1.047 - Nov. 1929 $1.076**

ket. Prices are a bit lower with metal at 8⅝c lb., oxide at 8⅝c lb., and needle at 10c lb. The decline in antimony prices has been almost continuous in recent years and there has at no time been any notable sustained recovery in market conditions despite occasional spurts in demand, and it seems evident that the general situation continues to be dominated by excessive production. Offers have not been pressed from China but there continues to be no interest displayed and market prospects seem rather poor. Commenting upon these conditions, "The Chemist & Druggist," London, says that "although resistance to the downward movement may possibly be encountered on the part of Chinese shippers, there is little doubt that competition from outside sources, which has been quietly growing of late years, is making itself felt at the expense of the Chinese industry. As previously pointed out, there was a particularly large increase in the Mexican output for last year to 3,578 metric tons, a new high record, although there was a set-back in 1927 from 2,614 tons (in 1926) to 1,924 tons. Before 1925, the output in that country was comparatively small and confined to three figures for a number of years. An important portion of the metal produced in Mexico is secured in the form of lead-antimony as a by-product of the lead smelters, particularly the smelters of the Compania Minera de Penoles at Monterey. Lead-antimony formed nearly one-fourth of the total Mexican production in 1926, and its proportion since has apparently steadily increased. Roughly one-half of the Mexican product is being marketed in the United States in the shape of refined metal, although the mineral secured from a certain area is exported. Mexico is thus the second largest producer of antimony, her output being fully one-fifth that of China, the leading world's producer, where the output has been fully maintained, being at the rate of about 1,400 tons a month, or approximately 17,000 tons per annum, according to recent estimates. The Mexican industry is apparently well regulated according to the current demand, and the fact that the calls made from that quarter have been increased has stimulated the output. Taking the world demand on the whole, it has been rather fitful, or not consistent or large enough to ensure a more stable market. In the event of any exceptional demand arising, for instance, for war purposes, the position, as happened before, would be quickly affected, as old stocks would have to be drawn upon. In the course of this year there has been an accumulation of stocks in China

| 1928 High | 1928 Low | 1927 High | 1927 Low | | Current Market | | 1929 High | 1929 Low |
|---|---|---|---|---|---|---|---|---|
| | | | | **Barium** | | | | |
| 57.00 | 47.00 | 47.50 | 47.50 | Barium, Carbonate, 200 lb bags wks....ton | 58.00 | 60.00 | 60.00 | 57.00 |
| .12½ | .12 | .12 | .12 | Chlorate, 112 lb kegs NY..lb. | .14 | .15 | .15 | .14 |
| 65.00 | 54.00 | 65.00 | 57.50 | Chloride, 600 lb bbl wks...ton | 65.00 | 69.00 | 69.00 | 63.00 |
| .13¼ | .13 | .13 | .13 | Dioxide, 88%, 690 lb drs...lb. | .12 | .13 | .13 | .12 |
| .04¾ | .04¾ | .04½ | .04½ | Hydrate, 500 lb bbls.......lb. | .04¾ | .05½ | .05½ | .04¾ |
| .08 | .07½ | .07½ | .07½ | Nitrate, 700 lb casks.......lb. | .08½ | .08½ | .08½ | .08½ |
| 24.00 | 23.00 | 23.00 | 23.00 | Barytes, Floated, 350 lb bbls wks....ton | 23.00 | 24.00 | 24.00 | 23.00 |
| 8.00 | 5.00 | ..... | ..... | Bauxite, bulk, mines........ton | 5.00 | 8.00 | 8.00 | 5.00 |
| .38 | .36 | .40 | .37 | Beeswax, Yellow, crude bags..lb. | ..... | .34 | .37 | .34 |
| .43 | .41 | .46 | .38 | Refined, cases..........lb. | ..... | .39 | .42 | .39 |
| .58 | .56 | .58 | .56 | White, cases..............lb. | .51 | .53 | .53 | .51 |
| .70 | .65 | .65 | .65 | Benzaldehyde, technical, 945 lb drums wks.............lb. | .60 | .65 | .65 | .60 |
| | | | | **Benzene** | | | | |
| .23 | .21 | .23 | .21 | Benzene, 90%, Industrial, 8000 gal tanks wks..........gal. | ..... | .23 | .23 | .23 |
| .23 | .21 | .23 | .21 | Ind. Pure, tanks works....gal. | ..... | .23 | .23 | .23 |
| .74 | .70 | .70 | .70 | Benzidine Base, dry, 250 lb bbls..................lb. | .70 | .74 | .74 | .70 |
| 1.00 | 1.00 | 1.00 | 1.00 | Benzoyl, Chloride, 500 lb drs.lb. | ..... | 1.00 | 1.00 | 1.00 |
| .25 | .25 | ..... | ..... | Benzyl, Chloride, tech drs....lb. | ..... | .25 | .25 | .25 |
| .26 | .24 | .24 | .24 | Beta-Naphthol, 250 lb bbl wk.lb. | .24 | .26 | .26 | .24 |
| 1.35 | 1.35 | 1.35 | 1.35 | Naphthylamine, sublimed, 200 lb bbls.................lb. | ..... | 1.35 | 1.35 | 1.35 |
| .65 | .63 | .63 | .63 | Tech, 200 lb bbls..........lb. | .60 | .65 | .68 | .60 |
| 90.00 | 80.00 | 80.00 | 80.00 | Blanc Fixe, 400 lb bbls wks..ton | 80.00 | 90.00 | 90.00 | 80.00 |
| | | | | **Bleaching Powder** | | | | |
| 2.25 | 2.25 | 2.25 | 2.00 | Bleaching Powder, 300 lb drs c-1 wks contract.......100 lb. | ..... | 2.25 | 2.25 | 2.25 |
| 2.00 | 2.00 | 2.25 | 2.00 | 700 lb drs c-1 wks contract ....................100 lb. | ..... | 4.00 | 4.00 | 4 00 |
| 5.25 | 4.65 | 3.75 | 4.75 | Blood, Dried, fob, NY......Unit | ..... | 4.10 | 4.60 | 4.00 |
| 5.35 | 4.75 | ..... | ..... | Chicago...............Unit | ..... | 4.50 | 5.00 | 4.40 |
| 5.05 | 4.50 | ..... | ..... | S. American shipt.......Unit | ..... | 4.25 | 4.70 | 4.25 |
| .35 | .31 | .30 | .28 | Blues, Bronze Chinese Milori Prussian Soluble........lb. | ..... | .35 | .35 | .32 |
| 30.00 | 29.00 | 38.00 | 29.00 | Bone, raw, Chicago.........ton | ..... | 42.00 | 42.00 | 42.00 |
| .07 | .06 | .06 | .06 | Bone, Ash, 100 lb kegs.......lb. | .06 | .07 | .07 | .06 |
| .08½ | .08½ | .08½ | .08½ | Black, 200 lb bbls.........lb. | ..... | .08½ | .08½ | .08½ |
| 37.00 | 31.00 | 30.00 | 28.00 | Meal, 3% & 50%, Imp....ton | ..... | 31.00 | 35.00 | 30.00 |
| .05 | ..2½ | .04½ | .04½ | Borax, bags...............lb. | .02½ | .03½ | .03½ | .02½ |
| .12 | .10½ | .11 | .11 | Bordeaux, Mixture, 16% pwd..lb. | .10½ | .12 | .12 | .10½ |
| .10 | .08 | .08 | .08 | Paste, bbls...............lb. | .10 | .10½ | .10½ | .10 |
| 28.00 | 26.00 | 28.00 | 26.00 | Brazilwood, sticks, shpmt....lb. | 26.00 | 28.00 | 28.00 | 26.00 |
| 1.20 | .60 | .60 | .60 | Bronze, Aluminum, powd blk.lb. | .60 | 1.20 | 1.20 | .60 |
| 1.25 | .55 | .55 | .55 | Gold bulk................lb. | .55 | 1.25 | 1.25 | .55 |
| 1.60 | 1.40 | 1.60 | 1.42 | Butyl, Acetate, normal drs... ...................... lb. | 18.9 | 19.3 | 19.3 | 18.4 |
| 1.55 | 1.35 | 1.55 | 1.42 | Tank, wks...............lb. | ..... | 18.6 | 18.6 | 18.1 |
| .70 | .70 | .70 | .70 | Aldehyde, 50 gal drs wks...lb. | ..... | .70 | .70 | .70 |
| | | | | Carbitol s ee Diethylene Glycol Mono (Butyl Ether)........ | ..... | ..... | ..... | ..... |
| | | | | Cellosolv e (see Ethylene glycol mono b utyl ether)......... | | | | |
| | | | | Furoate, tech., 50 gal. dr., lb. | ..... | .50 | .50 | .50 |
| .36 | .34 | .34 | .34 | Propionate, drs...........lb. | .34 | .36 | .36 | .34 |
| .60 | .60 | .60 | .60 | Stearate, 50 gal drs........lb. | ..... | .60 | .60 | .60 |
| .60 | .57 | .57 | .57 | Tartrate, drs..............lb. | .57 | .60 | .60 | .57 |
| 2.00 | 1.35 | 1.50 | 1.35 | Cadmium, Sulfide, boxes.....lb. | .95 | 1.75 | 1.75 | .75 |
| | | | | **Calcium** | | | | |
| 4.50 | 3.50 | 3.50 | 3.50 | Calcium, Acetate, 150 lb bags c-1................100 lb. | ..... | 4.50 | 4.50 | 4.50 |
| .09 | .06 | .07½ | .07½ | Arsenate, 100 lb bbls c-1 wks.....................lb. | .07 | .09 | .09 | .07 |
| .06 | .05 | .05 | .05 | Carbide, drs.............lb. | .05 | .06 | .06 | .05 |
| 1.00 | 1.00 | 1.00 | 1.00 | Carbonate, tech, 100 lb bags c-1.....................lb. | 1.00 | 1.00 | 1.00 | 1.00 |
| 27.00 | 25.00 | 27.00 | 27.00 | Chloride, Flake, 375 lb drs c-1 wks...............ton | ..... | 22.75 | 25.00 | 22.75 |
| 23.00 | 20.00 | 21.00 | 21.00 | Solid, 650 lb drs c-1 fob wks .........................ton | 20.00 | 20.00 | 20.00 | 20.00 |
| 52.00 | 52.00 | 52.00 | 52.00 | Nitrate, 100 lb bags.......ton | ..... | 42.00 | 52.00 | 42.00 |
| ..... | ..... | ..... | ..... | Peroxide, 100 lb. drs.......lb. | ..... | 1.25 | 1.25 | 1.25 |
| .08 | .07 | .09 | .09 | Phosphate, tech, 450 lb bbls lb. | .08 | .08½ | .08 | .07 |
| | | | | Stearate, 100 lb bbls.......lb. | .25 | .26 | .26 | .25 |
| | | | | Calurea, bags S. points. c.i.f. ton | ..... | 83.65 | 83.65 | 82.15 |
| .18 | .18 | ..... | ..... | Camwood, Bark, ground bbls..lb. | ..... | .18 | .18 | .18 |
| .28 | .22 | .33 | .33 | Candelilla Wax, bags........lb. | ..... | .22 | .24 | .22 |
| | | | | Carbitol, (See Diethylene Gycol Mono Methyl Ether)...... | ..... | ..... | ..... | ..... |
| .15 | .08 | .08 | .08 | Carbon, Decolorizing, 40 lb bags c-1....................lb. | .08 | .15 | .15 | .08 |
| .12 | 12 | .12 | .12 | Black, 100-300 lb cases 1c-1 NY.....................lb. | ..... | .12 | .12 | .12 |
| .06 | .05½ | .05½ | .05½ | Bisulfide, 500 lb drs 1c-1 NY.....................lb. | .05½ | .06 | .06 | .05½ |
| .06 | .06 | .06 | .06 | Dioxide, Liq. 20-25 lb cyl...lb. | ..... | .06 | .06 | .06 |
| .07½ | 07 | .07 | .07 | Tetrachloride, 1400 lb drs delivered...............lb. | .06½ | .07 | .07½ | .06½ |
| .58 | .45 | .50 | .50 | Carnauba Wax, Flor, bags....lb. | .36 | .37 | .43 | .35 |
| .60 | .40 | .90 | .54 | No. 1 Yellow, bags........lb. | ..... | .35 | .40 | .34 |
| .38 | .34 | .37 | .24 | No. 2 N Country, bags.....lb. | ..... | .28 | .32 | .28 |
| .56 | .38 | .68 | .48 | No. 2 Regular, bags.......lb. | ..... | .31 | .36 | .31 |
| .32 | .25 | ..... | ..... | No. 3 N. C...............lb. | ..... | .25 | .25 | .24 |
| .32 | 25½ | ..... | ..... | No. 3 Chalky.............lb. | ..... | .25 | .26 | .24 |
| .18¾ | .14½ | .18½ | .15½ | Casein, Standard, ground.....lb. | .15½ | .16½ | .17 | .15 |

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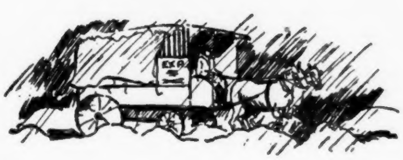


# Prices Current and Comment

**Purchasing Power of the Dollar: 1926 Average--$1.00 - Jan. 1927 $1.042 - Jan. 1928 $1.047 - Nov. 1929 $1.076**

of which, however, no reliable estimates have been obtainable. According to a more recent report from the United States Department of Commerce about 1,700 tons were lying at Changsha and 1,000 tons at Hankow on September 30, but total stocks in China have been placed up to as high as 4,000 tons, including metal lying at Hongkong and elsewhere. There was a steady increase in the American bonded stocks from the end of April this year from about 920 tons up to 1,400 tons by the end of July, which were the largest figures recorded since the same date last year, but the returns on August 31 showed a decrease to 1,245 tons, and there has probably been a further notable shrinkage since owing to the smaller shipments from China down to 370 tons for August, against 531 tons and 675 tons respectively for the two preceding months. The shipments advised for last month, however, were 723 tons, and the total shipped from China to America for the nine months amount to 6,340 tons, against only 4,882 tons for the same period last year. American imports during 1926 and 1927 were particularly heavy at well over 13,000 tons and 11,000 tons respectively, which was largely responsible for the high range of prices maintained in these two years, but they are now more in line with the average for the preceding five years to 1925 inclusive, which was about 9,000 tons.

**Barium Chloride** — Has been very active during the past month. The market was very firm with but limited quantities of foreign material available in the market. Imports of barium chemicals into the United States during the first nine months of this year, totaled 3,309 tons, valued at $106,178 compared to 6,288 tons, valued at $186,945, in the same period of 1928. The chief barium compounds imported are the precipitated carbonate, the chloride and the nitrate. Since the manufacture of barium chemicals involves in the cycle a number of other chemicals important to the chemical industry as a whole, either as raw materials or by-products, says the Department of Commerce, that it is interesting to observe the extent to which this industry is able to meet the domestic requirements as reflected by the above decrease in imports and increased domestic production.

**Beeswax** — Demand for crude has fallen off somewhat so that quotations are now at 34c lb. September imports of beeswax and other animal wax amounted to 521,681 pounds, valued at $132,730, of which the largest quantity, 172,310 pounds, came from Great Britain. The

| 1928 High | 1928 Low | 1927 High | 1927 Low | | Current Market | | 1929 High | 1929 Low |
|---|---|---|---|---|---|---|---|---|
| | | | | Cellosolve (see Ethylene glycol mono ethyl ether)......... | | | | |
| | | | | Acetate (see Ethylene glycol mono ethyl ether acetate).. | | | | |
| .30 | .26 | .34 | .26 | Celluloid, Scraps, Ivory cs....lb. | .26 | .30 | .30 | .26 |
| .20 | .18 | .18 | .18 | Shell, cases...............lb. | .18 | .20 | .20 | .18 |
| .32 | .30 | .34 | .26 | Transparent, cases........ lb. | .30 | .32 | .32 | .30 |
| 1.40 | 1.40 | 1.40 | 1.40 | Cellulose, Acetate, 50 lb kegs .lb. | 1.20 | 1.25 | 1.25 | 1.20 |
| .03¾ | .03 | .03 | .03 | Chalk, dropped, 175 lb bbls...lb. | .03 | .03¾ | .03¾ | .03 |
| .04¼ | .04¼ | .02¼ | .02¼ | Precip, heavy, 560 lb cks...lb. | .02 | .03¼ | .03¼ | .02 |
| .03¼ | .02¼ | .04¼ | .04¼ | Light, 250 lb casks........lb. | .02¼ | .03¼ | .03¼ | .02¼ |
| .19 | .18 | .18 | .18 | Charcoal, Hardwood, lump, bulk wks...................bu. | .18 | .19 | .19 | .18 |
| .06½ | .06 | .06 | .06 | Willow, powd, 100 lb bbl wks....................lb. | .06 | .06½ | .06½ | .06 |
| .05 | .04 | .04 | .04 | Wood, powd, 100 lb bbls...lb. | .04 | .05 | .05 | .04 |
| .03 | .02 | .03 | .02¼ | Chestnut, clarified bbls wks,..lb. | .02¼ | .03 | .02 | .03¼ |
| .02 | .01½ | .02 | .01½ | 25% tks wks..............lb. | .01¾ | .02½ | .02½ | .01½ |
| .04 4/5 | .04 4/5 | .05½ | .05½ | Powd, 60%, 100 lb bgs wks.lb. | ..... | .04 4/5 | .04 4/5 | .04 4/5 |
| .06 | .05½ | .06½ | .06½ | Powd, decolorized bgs wks..lb. | .05½ | .06 | .06 | .05½ |
| 9.00 | 8.00 | 8.00 | 8.00 | China Clay, lump, blk mines.ton | 8.00 | 9.00 | 9.00 | 8.00 |
| .02 | .01¾ | .01¾ | .01¾ | Powdered, bbls............lb. | .01¾ | .02 | .02 | 01¾ |
| 12.00 | 10.00 | 10.00 | 10.00 | Pulverized, bbls wks......ton | 10.00 | 12.00 | 12.00 | 10.00 |
| 25.00 | 15.00 | 15.00 | 15.00 | Imported, lump, bulk.....ton | 15.00 | 25.00 | 25.00 | 15.00 |
| .03½ | .03 | .03 | .03 | Powdered, bbls............lb. | .03 | .03½ | .03½ | .03 |
| | | | | **Chlorine** | | | | |
| .09 | .08 | .08 | .08 | Chlorine, cyls 1c-1 wks contract ........................lb. | .07½ | .08½ | .08½ | .07½ |
| ..... | ..... | ..... | ..... | cyls, cl wks,. contract ...lb. | ..... | .04½ | .04½ | .04½ |
| .03½ | .03½ | .05½ | .04 | Liq tank or multi-car lot cyls wks contract............lb. | .0275 | .0285 | .03 | .0275 |
| .07 | .07 | .07 | .07 | Chlorobenzene, Mono, 100 lb. drs 1c-1 wks............lb. | .08½ | .09½ | .09½ | .08½ |
| .22 | .20 | .20 | .20 | Chloroform, tech, 1000 lb drs..lb. | ..... | .16 | .20 | .16 |
| 1.35 | 1.00 | 1.00 | 1.00 | Chloropicrin, comml cyls.....lb. | 1.00 | 1.35 | 1.35 | 1.00 |
| .29 | .26 | .27 | .26 | Chrome, Green, CP..........lb. | .26 | .29 | .29 | .2C |
| .11 | .06½ | .06½ | .06½ | Commercial...............lb. | .06½ | .11 | .11 | .06½ |
| .17 | .15½ | .17½ | .16½ | Yellow...................lb. | .17 | .18 | .18 | .15 |
| .05¾ | .04¾ | .05 | .04½ | Chromium, Acetate, 8% Chrome bbls....................lb. | .04¾ | .05¾ | .05¾ | .04¾ |
| .05½ | .05½ | .05½ | .05½ | 20° soln, 400 lb bbls.....lb. | ..... | .05½ | .05½ | .05½ |
| .28 | .27 | .27 | .27 | Fluoride, powd, 400 lb bbl..lb. | .27 | .28 | .28 | .27 |
| .35½ | .34½ | .34½ | .34½ | Oxide, green, bbls.........lb. | .34½ | .35½ | .35½ | .34½ |
| 9.50 | 9.00 | 9.50 | 9.00 | Coal tar, bbls..............bbl | 10.00 | 10.50 | 10.50 | 10.00 |
| 2.22 | 2.10 | 2.10 | 2.10 | Cobalt Oxide, black, bags....lb. | 2.10 | 2.22 | 2.22 | 2.10 |
| .87 | .84 | .92 | .77 | Cochineal, gray or black bag..lb. | ..... | .95 | .95 | .95 |
| .86 | .86 | .92 | .77 | Teneriffe silver, bags.......lb. | ..... | .95 | .95 | .95 |
| | | | | **Copper** | | | | |
| 17.00 | 12.90 | 13.57½ | 12.90 | Copper, metal, electrol...100 lb. | ..... | 17.78 | 24.00 | 17.00 |
| .17½ | .16 | .16¾ | .06½ | Carbonate, 400 lb bbls.....lb. | .13 | .21½ | .25 | .13 |
| .28 | .28 | .28 | .28 | Chloride, 250 lb bbls.......lb. | .25 | .28 | .28 | .25 |
| .50 | .48 | .48 | .48 | Cyanide, 100 lb drs........lb. | .50 | .55 | .60 | .48 |
| .17 | .16½ | .16½ | .16½ | Oxide, red, 100 lb bbls.....lb. | .24 | .32 | .32 | .16½ |
| .19 | .18 | .18 | .17 | Sub-acetate verdigris, 400 lb bbls....................lb. | .18 | .19 | .19 | .18 |
| 5.50 | 5.05 | 5.00 | 4.75 | Sulfate, bbls c-1 wks...100 lb. | ..... | 5.50 | 7.00 | 5.50 |
| 14.00 | 13.00 | 17.00 | 13.00 | Copperas, crys and sugar bulk c-1 wks................ton | 13.00 | 14.00 | 14.00 | 13.00 |
| 1.35 | 1.25 | 1.25 | 1.25 | Sugar, 100 lb bbls.....100 lb. | 1.25 | 1.35 | 1.35 | 1.25 |
| .42 | .40 | .40 | .40 | Cotton, Soluble, wet, 100 lb bbls....................lb. | .40 | .42 | .42 | .40 |
| ..... | ..... | 42.00 | 20.00 | Cottonseed, S. E. bulk c-1...ton | ..... | ..... | ..... | ..... |
| ..... | ..... | 42.00 | 20.00 | Meal S. E. bulk..........ton | ..... | ..... | ..... | ..... |
| 38.00 | 36.00 | 35.00 | 21.50 | 7% Amm., bags mills...ton | 37.50 | 38.00 | 38.00 | 37.50 |
| .27½ | .26 | .27 | .22 | Cream Tartar, USP, 300 lb. bbls....................lb. | ..... | .26½ | .28 | .26½ |
| .42 | .40 | .40 | .40 | Creosote, USP, 42 lb cbys....lb. | .40 | .42 | .42 | .40 |
| .19 | .17 | .20 | .20 | Oil, Natural, 50 gal drs....gal. | .17 | .19 | .19 | .17 |
| .23 | .21 | .25 | .25 | 10-15% tar acid........gal. | .21 | .23 | .23 | .21 |
| .28 | .25 | ..... | ..... | 25-30% tar acid........gal. | .25 | .28 | .28 | .25 |
| .20 | .17½ | .17½ | .17½ | Cresol, USP, drums..........lb. | .14 | .17 | .17 | .14 |
| | | | | Crotonaldehyde, 50 gal dr....lb. | .32 | .36 | | |
| .17 | .16 | .17 | .16 | Cudbear, English............lb. | .16 | .17 | .17 | .16 |
| .18½ | .18½ | .18½ | .15 | Cutch, Rangoon, 100 lb bales..lb. | .14 | .16 | .16 | .14 |
| .07 | .06 | .05 | .05½ | Borneo, Solid, 100 lb bale..lb. | .08 | 08½ | .08½ | .08 |
| 1.75 | 1.67½ | 1.82½ | 1.67½ | Cyanamide, bulk c-1 wks Nitrogen unit ............ | ..... | 2.00 | 2.00 | 2.00 |
| 5.12 | 3.77 | 3.92 | 3.77 | Dextrin, corn, 140 lb bags.100 lb. | 4.72 | 4.92 | 4.92 | 4 62 |
| 5.07 | 3.72 | 3.87 | 3.72 | White, 130 lb bags.....100 lb. | 4.67 | 4.87 | 4.87 | 4.57 |
| .09 | .08 | .08½ | .08½ | Potato, Yellow, 220 lb bgs..lb. | .08 | .09 | .09 | .08 |
| .09 | .08 | .08½ | .08½ | White, 220 lb bags 1c-1....lb. | .08 | .09 | .09 | .08 |
| .08½ | .08 | .08½ | .08 | Tapioca, 200 lb bags 1c-1...lb. | .08 | .08½ | .08½ | .08 |
| ..... | ..... | 3.80 | 3.80 | Diaminophenol, 100 lb kegs...lb. | ..... | 3.80 | 3.80 | 3.80 |
| 3.80 | 3.80 | 2.95 | 2.85 | Diamylphthalate, drs wks...gal. | ..... | 3 80 | 3 80 | 3.80 |
| 2.90 | 2.85 | 3.25 | 3.25 | Dianisidine, 100 lb kegs......lb. | 3.00 | 3.10 | 3.10 | 3.00 |
| .28 | .26½ | .31½ | .29½ | Dibutylphthalate, wks.......lb. | ..... | .26½ | .26½ | .26½ |
| .31½ | .29½ | .55 | .55 | Dibutyltartrate, 50 gal drs....lb. | .29½ | .31½ | .31½ | .29½ |
| ..... | ..... | ..... | ..... | Dichloroethylether, 50 gal drs lb. | .05 | .07 | .13 | .05 |
| .65 | .55 | .23 | .23 | Dichloromethane, drs wks....lb. | .55 | .65 | .65 | .55 |
| .25 | .23 | 2.15 | 2.15 | Diethylamine, 400 lb drs.....lb. | 2.75 | 3.00 | 3.00 | 2.75 |
| 2.15 | 2.15 | 1 85 | 1.85 | Diethylcarbonate, drs ......gal. | 1.85 | 1.90 | 1.90 | 1.85 |
| 2.00 | 1.85 | .55 | .55 | Diethylaniline, 850 lb drs.....lb. | .55 | .60 | .60 | .55 |
| .60 | .55. | 20 | .20 | Diethyleneglycol, drs........lb. | .10 | .12 | .13 | .10 |
| .15 | .10 | ..... | ..... | Mono ethyl ether, drs....lb. | .13 | .15 | .15 | .13 |
| .35 | .25 | ..... | ..... | Mono butyl ether, drs....lb. | .28 | .30 | .30 | .25 |
| | | | | Mono methyl ether, 50 gal. | | | .15 | .13 |
| ..... | ..... | ..... | ..... | dr...................lb. | .15 | .18 | .22 | .15 |
| ..... | ..... | ..... | ..... | Diethylene oxide, 50 gal dr....lb. | ..... | .50 | .50 | .50 |
| .67 | .64 | .64 | .64 | Diethylorthotoluidin, drs.....lb. | .64 | .67 | .67 | .64 |
| .26 | .24 | .25 | .25 | Diethyl phthalate, 1000 lb drums..................lb. | .24 | .26 | .26 | .24 |
| .35 | .30 | .30 | .30 | Diethylsulfate, technical, 50 gal drums..................lb. | .30 | .35 | .35 | .30 |
| 2 62 | 2.62 | 2.60 | 2.60 | Dimethylamine, 400 lb drs...lb. | ..... | 2.62 | 2.62 | 2.62 |
| .32 | .30 | .32 | .30 | Dimethylaniline, 340 lb drs...lb. | .30 | .32 | .32 | 30 |

# *Prices Current and Comment*

**Purchasing Power of the Dollar: 1926 Average--$1.00 - Jan. 1927 $1.042 - Jan. 1928 $1.047 - Nov. 1929 $1.076**

next largest shipment, 56,296 pounds, was sent by Brazil. Vegetable wax imports for the month totaled 349,229 pounds, worth $52,751, the largest quantity, 273,520 pounds, coming from Japan.

**Benzol** — It is reported that general price conditions have been somewhat unsteady during the past month with various evidences of price shading. Demand has slackened somewhat both from export and iron and steel business, which probably accounts to a large extent for the unsettled conditions. Producers are holding firm at quoted levels. The lack of demand is seasonal and expected.

**Bleaching Powder** — Producers report that this market is generally steady although there is no expectation that export business will be anything like what it has been in past seasons. Exports of bleaching powder amounting to 2,255 tons, valued at $111,687 for the first nine months of 1929 show a decline of 61 per cent in value and 74 per cent in weight from the 1928 exports for the same period. To what extent this decline reflects developments of bleaching chemicals of high concentrations which retain their strength over long periods, is not known, says the Department of Commerce, but recent improvements in manufacturing processes have resulted in chlorinated bleaching compounds of greater stability and about double the chlorine content of the old type product. Domestic output of chlorinated lime in 1927 was 3,751 tons less than in 1925, but was valued higher by $183,601. Wider adoption of hydrogen peroxide in textile and other bleaching may be another factor affecting the use of chlorinated products. Likewise, the development of peroxide of 100 volume strength as compared to the former 10 volumes can logically be expected to promote its adoption as far as the economic aspect is concerned.

**Borax** — During the past month, producers have readjusted prices on this material in order that a differentiation might be made on the powdered form which is now quoted at a premium.

**Butyl Acetate** — Due to the easier position of acetic acid, producers of this material lowered prices during the past month so that drums are now quoted on the basis of 18.4c @ 18.8c lb., while tanks are at 18.1c lb. The reduction also probably was made with the thought of encouraging demand, which, in common with the other members of the solvent group, has fallen off due to the usual seasonal slump.

| 1928 High | 1928 Low | 1927 High | 1927 Low | | Current Market | | 1929 High | 1929 Low |
|---|---|---|---|---|---|---|---|---|
| .50 | .45 | .45 | .45 | Dimethylsulfate, 100 lb drs...lb. | .45 | .50 | .50 | .45 |
| .16½ | .15½ | .15½ | .15 | Dinitrobenzene, 400 lb bbls...lb. | .15½ | .16½ | .16½ | .15½ |
| .16 | .15 | .15 | .15 | Dintrochlorobenzene, 400 lb bbls..................lb. | .13 | .15 | .15 | .1. |
| .34 | .32 | .32 | .32 | Dinitronaphthalene, 350 lb bbls ......................lb. | .34 | .37 | .37 | .34 |
| .32 | .31 | .31 | .31 | Dinitrophenol, 350 lb bbls....lb. | .31 | .32 | .32 | .31 |
| .19 | .18 | .18 | .15 | Dinitrotoluene, 300 lb bbls...lb. | 18 | .19 | .19 | .18 |
| .90 | .48 | 1.05 | .85 | Diorthotolyguanidine, 275 lb bbls wks...............lb. | .42 | .46 | .49 | .42 |
| ..... | ..... | ..... | ..... | Dioxan (See Diethylene Oxide) | ..... | ..... | ..... | ..... |
| | | | | Diphenyl...................lb. | .40 | .50 | .50 | .40 |
| .47 | .45 | .48 | .45 | Diphenylamine.............lb. | ..... | .40 | .47 | .40 |
| .72 | .40 | ..... | ..... | Diphenylguanidine, 100 lb bbl lb. | .30 | .35 | .40 | .30 |
| .30 | .26 | .26 | .26 | Dip Oil, 25%, drums........lb. | .26 | .30 | .30 | .26 |
| 62.00 | 58.00 | 49.00 | 41.00 | Divi Divi pods, bgs shipmt..ton | ..... | 46.50 | 57.00 | 46.50 |
| .05½ | .05 | .04 | .04 | Extract.................lb. | .05 | .05½ | .05½ | .05 |
| .82 | .73 | .84 | .72 | Egg Yolk, 200 lb cases.......lb. | .77 | .79 | .84 | .77 |
| 1.75 | 1.7 | 2 00 | 1.75 | Epsom Salt, tech, 300 lb bbls c-1 NY............100 lb. | 1.70 | 1.90 | 1.90 | 1.70 |
| .38 | .37 | .45 | .37 | Ether, USP, 1880, 50 lb drs..lb. | .38 | .39 | .39 | .38 |
| 1.05 | .75 | .90 | .90 | Ethyl Acetate, 85% Ester, ... tanks.................lb. | ..... | 12.2 | 12.2 | 12.2 |
| 1.25 | 1.10 | 1.10 | 1.03 | drums.................lb. | 12.5 | 12.9 | 12.9 | 12.5 |
| ..... | ..... | ..... | ..... | Acetoacetate, 50 gal drs....lb. | .65 | .68 | .68 | .65 |
| 1.11 | 1.05 | 1.05 | 1.05 | Benzylaniline, 300 lb drs...lb. | 1.05 | 1.11 | 1.11 | 1.05 |
| .70 | .70 | .50 | .50 | Bromide, tech, drums ......lb. | .50 | .55 | .55 | .50 |
| ..... | ..... | ..... | ..... | Carbonate, 90%, 50 gal drs gal. | 1.85 | 1.90 | 1.90 | 1.85 |
| .22 | .22 | .22 | .22 | Chloride, 200 lb. drums....lb. | ..... | .22 | .22 | .22 |
| ..... | ..... | ..... | ..... | Chlorocarbonate, 50 gal dr.gal. | .35 | .40 | .40 | .35 |
| ..... | ..... | ..... | ..... | Ether, Absolute, 50 gal drs..lb. | .50 | .52 | .52 | .50 |
| | | | | Furoate, 1 lb tins .........lb. | ..... | 5.00 | 5.00 | 5.00 |
| 3.50 | 3.50 | 3.50 | 3.50 | Lactate, drums works......lb. | .25 | .29 | .35 | .25 |
| .30 | .30 | .30 | .30 | Methyl Ketone, 50 gal drs..lb. | ..... | .30 | .30 | .30 |
| .55 | .45 | .45 | .45 | Oxalate, drums works......lb. | .45 | .55 | .55 | .45 |
| .36 | .30 | ..... | ..... | Oxybutyrate, 50 gal drs wks.lb. | ..... | .30½ | .36 | .30 |
| .70 | .70 | .70 | .70 | Ethylene Bromide, 60 lb dr...lb. | ..... | .70 | .70 | .79 |
| .85 | .75 | .75 | .75 | Chlorhydrin, 40%, 50 gal drs chloro. cont............lb. | .75 | .85 | .85 | .75 |
| .11 | .07 | .15 | .11 | Dichloride, 50 gal drums...lb. | .05 | .07 | .10 | .05 |
| .40 | .25 | .30 | .30 | Glycol, 50 gal drs wks.....lb. | .25 | .28 | .30 | .25 |
| .27 | .31 | ..... | ..... | Mono Butyl Ether drs wks. | .23 | .27 | .31 | .23 |
| .20 | .24 | ..... | ..... | Mono Ethyl Ether drs wks | .16 | .20 | .24 | .16 |
| .23 | .26 | ..... | ..... | Mono Ethyl Ether Acetate dr. wks.................. | .19 | .23 | .26 | .19 |
| | | | | Mono Methyl Ether, drs.lb. | .19 | .23 | .23 | .19 |
| | | | | Oxide, cyl................lb. | ..... | 2.00 | | |
| .65 | .62 | .62 | .62 | Ethylidenaniline........lb. | .62 | .65 | .65 | .62 |
| 25.00 | 20.00 | 20.00 | 20.00 | Feldspar, bulk.............ton | 25.00 | 20.00 | 25.00 | 20.00 |
| 21.00 | 15.00 | 15.00 | 15.00 | Powdered, bulk works.....ton | 15.00 | .21 | 21.00 | 15.00 |
| .09 | .07½ | .07½ | .07½ | Ferric Chloride, tech, crystal 475 lb bbls............lb. | .07½ | .09 | .09 | .07 |
| 5.50&10 | 4.90&10 | 5.60 | 4.15 | Fish Scrap, dried, wks......unit | ..... | 4.25&10 | 4.25&10 | 3.65&10 |
| 4.75&50 | 4.00&50 | 3.50 | 4.24 | Acid, Bulk 7 & 3½% delivered Norfolk & Balt. basis...unit | ..... | 3.50&50 | 4.00&50 | 3.50&50 |
| 1.15 | 1.10 | 1.10 | .90 | Flavine, lemon, 55 lb cases...lb. | 1.10 | 1.15 | 1.15 | 1.10 |
| 1.15 | 1.10 | 1.10 | .85 | Orange, 70 lb cases........lb. | 1.10 | 1.15 | 1.15 | 1.10 |
| | | | | Flaxseed.................lb. | ..... | ..... | | |
| ..... | ..... | ..... | ..... | Ex-dock..............ton | ..... | 25.00 | 25.00 | 25.00 |
| 25.00 | 25.00 | 25.00 | 25.00 | Fluorspar, 98%, bags.......... | 41.00 | 46.00 | 46.00 | 41.00 |
| | | | | **Formaldehyde** | | | | |
| ..... | ..... | ..... | ..... | Formaldehyde, aniline, 100 lb. | ..... | ..... | ..... | ..... |
| .42 | .39 | .39 | .39 | drums..................lb. | .39 | .42 | .42 | .39 |
| .09 | .08½ | .11½ | .08½ | USP, 400 lb bbls wks......lb. | .08½ | .09 | .10 | .08½ |
| .04 | .02½ | .02½ | .02½ | Fossil Flour................lb. | .02½ | .04 | .04 | .02½ |
| 20.00 | 15.00 | 15.00 | 15.00 | Fullers Earth, bulk, mines ..ton | 15.00 | 20.00 | 20.00 | 15.00 |
| 30.00 | 25.00 | 25.00 | 25.00 | Imp. powd c-1 bags.......ton | 25.00 | 30.00 | 30.00 | 25.00 |
| .19½ | .17½ | .17½ | .17½ | Furfural 500 lb drums.......lb. | .17½ | .19½ | .19½ | .17½ |
| ..... | ..... | ..... | ..... | Furfuramide (tech) 100 lb dr..lb. | ..... | .30 | .30 | .30 |
| ..... | ..... | ..... | ..... | Furfuryl Acetate, 1 lb tins....lb. | ..... | 5.00 | 5.00 | 5.00 |
| ..... | ..... | ..... | ..... | Alcohol, (tech) 100 lb dr....lb. | ..... | .50 | .50 | .50 |
| ..... | ..... | ..... | ..... | Furoic Acid (tech) 100 lb dr...lb. | ..... | .50 | 1.00 | .50 |
| 1.35 | 1.3 | 1.69 | 1.35 | Fusel Oil, 10% impurities...gal. | ..... | 1.35 | 1.35 | 1.35 |
| .05 | .04 | .04 | .04 | Fustic, chips...............lb. | .04 | .05 | .05 | .04 |
| .22 | .20 | .20 | .20 | Crystals, 100 lb boxes......lb. | .20 | .22 | .22 | .20 |
| .10 | .09 | .09 | .09 | Liquid, 50°, 600 lb bbls....lb. | .09 | .10 | .10 | .09 |
| .23 | .20 | .20 | .20 | Solid, 50 lb boxes.........lb. | .14 | .16 | .16 | .14 |
| 32.00 | 30.00 | 30.00 | 30.00 | Sticks...................ton | 25.00 | 26.00 | 26.00 | 25.00 |
| .52 | .50 | .50 | .50 | G Salt paste, 360 lb bbls.....lb. | .45 | .50 | .52 | .45 |
| 21 | .20 | .20 | .20 | Gall Extract...............lb. | .20 | .21 | .21 | .20 |
| .09 | .08 | .08 | .06 | Gambier, common 200 lb cs...lb. | .06 | .07 | .07 | .06 |
| .14 | .12 | .12 | .12 | 25% liquid, 450 lb bbls....lb. | .12 | .14 | .14 | .12 |
| .12 | .11 | .23 | .11 | Singapore cubes, 150 lb bg..lb. | .08½ | .09 | .09 | .08½ |
| .50 | .45 | .45 | .30 | Gelatin, tech, 100 lb cases....lb. | .45 | .50 | .50 | .45 |
| 1.00 | .70 | 1.05 | 1.05 | Glauber s Salt, tech, c-1 wks...............100 lb. | 1.00 | 1.70 | 1.70 | .70 |
| 3.34 | 3.24 | 3.24 | 3.24 | Glucose (grape sugar) dry 70-80° bags c-1 NY........100 lb. | 3.24 | 3.34 | 3.34 | 3.20 |
| 3.14 | 3.14 | 3.14 | 3.14 | Tanner's Special, 100 lb bags ....................100 lb. | ..... | 3.14 | 3.14 | 3.14 |
| .24 | .20 | .20 | .20 | Glue, medium white, bbls...lb. | .20 | .24 | .24 | .20 |
| .26 | .22 | .22 | .22 | Pure white, bbls..........lb. | .22 | .26 | .26 | .22 |
| .19 | .15 | .29 | .22 | Glycerin, CP, 550 lb drs.....lb. | .14 | .14½ | .16 | .13½ |
| .15 | .11½ | .25 | .17 | Dynamite, 100 lb drs......lb. | .11½ | .12 | .12½ | .10½ |
| .10½ | .08½ | ..... | ..... | Saponification, tanks......lb. | .07½ | .08 | .08½ | .07½ |
| .09½ | .07½ | ..... | ..... | Soap Lye, tanks...........lb. | .06½ | .07 | .07½ | .06½ |
| 35.00 | 15.00 | 15.00 | 15.00 | Graphite, crude, 220 lb bgs...ton | 15.00 | 35.00 | 35.00 | 15.00 |
| .09 | .06 | .05 | .05 | Flake, 500 lb bbls.........lb. | .06 | .09 | .09 | .06 |
| | | | | **Gums** | | | | |
| .04½ | .03½ | .03½ | .03½ | Gum Accroides, Red, coarse and fine 140-150 lb bags......lb. | .03½ | .04½ | .04½ | .03 |
| .06½ | .06½ | .06 | .06 | Powd, 150 lb bags.........lb. | .06 | .06½ | .06½ | .06½ |

Gum, Asphaltum
Magnesium Carbonate

# *Prices Current and Comment*

**Purchasing Power of the Dollar: 1926 Average--$1.00 - Jan. 1927 $1.042 - Jan. 1928 $1.047 - Nov. 1929 $1.076**

**Calcium Acetate** — Although wood distillers have made no increase in production, conditions in this market are somewhat easier. Business is continuing in good condition, but the seasonal slackness of the lacquer manufacturers has had its effect here too.

**Calcium Chloride** — Continues in very heavy demand especially from the coal industry. With this comparatively new source discounted, the volume of business has been about the same as for the month of November of last year.

**Carnauba Wax** — Has been very generally in good demand during the past month so that prices are generally higher and the market strong. Flor is now at 36c @ 37c lb.; No. 1 yellow at 35c lb.; No. 2 N country at 28c lb.; No. 2 regular at 31c lb.; and No. 3 N. C. and chalky at 25c lb.

**Casein**—Has been very quiet, which is an unusual condition for this season of the year. The condition is generally attributed to the tariff controversy. During the preliminary discussion when it seemed almost certain that a higher duty was imminent, consumers all stocked up heavily. At that time this present reaction was predicted. The situation is further complicated by the fact that the present indefinite status of the tariff has the effect of postponing any activity as the tendency is to wait to see what will happen. Quotations continue steady at 15½c @ 16½c lb.

**Chlorine** — Contracts were reported to be coming in in good volume and to date well up with the record of last year at this time. The lower contract prices are an encouraging factor for consumers in anticipating their demands for the coming season.

**Copper Sulfate** — Has not been very active during the past month which is reported to have been one of the quietest in history. Although it is true that November is seasonally an "off" month, the extent of the inactivity this year is quite unusual. Agricultural business, of course, is not placed yet, as this is generally held off until about the middle of January, at which time producers can usually make some estimate as to their costs of production. But even with this in consideration, new business has been very light, although shipments have totaled well above those for the same month of last year. Prices are still below their natural level due to an effort to meet imported competition. Although there is practically no material coming in on the Atlantic Coast, there is reported to be considerable available on

| 1928 High | 1928 Low | 1927 High | 1927 Low | | Current Market | | 1929 High | 1929 Low |
|---|---|---|---|---|---|---|---|---|
| .20 | .18 | .18 | .18 | Yellow, 150-200 lb bags....lb. | 18 | .20 | .20 | .18 |
| .40 | .35 | .40 | .35 | Animi (Zanzibar) bean & pea 250 lb cases....lb. | .35 | .40 | .40 | .35 |
| .55 | .50 | .60 | .50 | Glassy, 250 lb cases....lb. | .50 | .55 | .55 | .50 |
| .12 | .09 | .09 | .09 | Asphaltum, Barbadoes (Manjak) 200 lb bags....lb. | .09 | .12 | .12 | .09 |
| .17 | .15 | .15 | .15 | Egyptian, 200 lb cases....lb. | .15 | .17 | .17 | .15 |
| 65.00 | 55.00 | 55.00 | 55.00 | Gilsonite Selects, 200 lb bags....ton | 58.00 | 65.00 | 65.00 | 58.00 |
| .26 | .22½ | .26½ | .26½ | Damar Batavia standard 136, lb cases....lb. | .22 | .22½ | .26 | .22 |
| .11 | .10½ | .10½ | .07 | Batavia Dust, 160 lb bags....lb. | .10½ | .11 | .11 | .10½ |
| .17½ | .16 | .18½ | .17½ | E Seeds, 136 lb cases....lb. | .15 | .15½ | .17½ | .15 |
| .14½ | .13 | .14 | .09 | F Splinters, 136 lb cases and bags....lb. | .13 | .13½ | .13½ | .13 |
| .30½ | .29½ | .34 | .33½ | Singapore, No 1, 224 lb cases lb. | .26 | .28 | .30½ | .26 |
| .24 | .20 | .22½ | .21 | No. 2, 224 lb cases....lb. | ..... | .21½ | .24 | .21½ |
| .15 | .13½ | .14 | .11 | No. 3, 180 lb bags....lb. | .10 | .11½ | .14 | .10 |
| .48 | .33 | .35 | .30 | Benzoin Sumatra, U. S. P. 120 lb cases....lb. | .38 | .40 | .40 | .38 |
| .15 | .14 | .14 | .12 | Copal Congo, 112 lb bags, clean opaque....lb. | .16 | .17 | .17 | .14 |
| .09 | .08¾ | .08¾ | .08¾ | Dark, amber....lb. | .08¾ | .09 | .09 | .08¾ |
| .14 | .12½ | .12½ | .12½ | Light, amber....lb. | .12½ | .14 | .14 | .12½ |
| .36 | .35 | .35 | .35 | Water white....lb. | .35 | .36 | .36 | .35 |
| .65 | .58 | ..... | ..... | Mastic....lb. | .63 | .65 | .65 | .58 |
| | | | | Manila, 180-190 lb baskets | | | | |
| .17½ | .16 | .16 | .16 | Loba A....lb. | .17 | .17½ | .17½ | .17 |
| .16½ | .15 | .15 | .15 | Loba B....lb. | .15½ | .16 | .16½ | .15½ |
| .14 | .13 | .14½ | .13 | Loba C....lb. | .13½ | .14 | .14½ | .13½ |
| .19 | .16 | .16 | .16 | Pale bold, 224 lb cs....lb. | .17 | .19 | .19 | .17 |
| .13½ | .12 | .14 | .12 | Pale nubs....lb. | .13 | .13½ | .13½ | .13 |
| .11 | .07½ | .07½ | .07½ | East Indies chips, 180 lb bags lb. | .10 | .11 | .11 | .10 |
| .21 | .17 | ..... | ..... | Pale bold, 180 lb bags....lb. | .20 | .21 | .21 | .20 |
| .16 | .14 | .17 | .17 | Pale nubs....lb. | .15 | .16 | .16 | 15 |
| ..... | ..... | ..... | ..... | Pontianak, 224 lb cases....lb. | ..... | ..... | | |
| .25½ | .22 | .29 | .25 | Pale bold gen No 1....lb. | .20 | .21 | .23 | .20 |
| .15 | .13 | .19 | .13 | Pale gen chips spot....lb. | .14½ | .15 | .15 | .14½ |
| .14 | .13 | .14 | .13 | Elemi, No. 1, 80-85 lb cs....lb. | .13½ | .14 | .14 | .13½ |
| .13½ | .13 | .13 | .12 | No. 2, 80-85 lb cases....lb. | .13 | .13½ | .13½ | .13 |
| .13 | .12 | .13 | .11 | No. 3, 80-85 lb cases....lb. | .12 | .13 | .13 | .12 |
| .57 | .50 | .67½ | .57 | Kauri, 224-226 lb cases No. 1 .......... | .50 | .57 | .57 | .50 |
| .38 | .35 | .44½ | .38 | No. 2 fair pale....lb. | .35 | 38 | .38 | .35 |
| .12 | .10 | .14½ | .10 | Brown Chips, 224-226 lb cases....lb. | .10 | .12 | .12 | .10 |
| ..... | ..... | .42 | .38 | Bush Chips, 224-226 lb | ..... | ..... | | |
| .40 | .38 | ..... | ..... | cases....lb. | .38 | .40 | .40 | .38 |
| ..... | ..... | ..... | ..... | Pale Chips, 224-226 lb cases | | | | |
| .26 | .24½ | .31½ | .24½ | ....lb. | .24½ | .26 | .26 | .24½ |
| .60 | .26 | .27 | .25 | Sandarac, prime quality, 200 lb bags & 300 lb casks...lb | .40 | .38 | .72 | .35 |
| ..... | ..... | ..... | ..... | Helium, 1 lit. bot....lit. | ..... | 25.00 | .20 | .17 |
| .20 | .17 | .12 | .12 | Hematine crystals, 400 lb bbls lb. | .17 | .20 | .11 | .17 |
| .11 | .11 | .09 | .09 | Paste, 500 bbls....lb. | ..... | .11 | .11 | .11 |
| .03¾ | .03½ | .03½ | .03½ | Hemlock 25%, 600 lb bbls wks lb. | .03½ | .03¾ | .03¾ | .03½ |
| 16.00 | 16.00 | 16.00 | 16.00 | Bark....ton | ..... | 16.00 | 17.00 | 16.00 |
| .60 | .60 | .60 | .45 | Hexalene, 50 gal drs wks....lb. | ..... | .60 | .60 | .60 |
| .56 | .62 | .80 | .62 | Hexamethylenetetramine, drs.lb. | .48 | .50 | .58 | .48 |
| 4.00 | 4.00 | 3.35 | 2.75 | Hoof Meal, fob Chicago....unit | ..... | 3.75 | 4.00 | 3.75 |
| ..... | ..... | 3.90 | 3.0 | South Amer. to arrive....unit | ..... | 3.75 | 3.90 | 3.75 |
| .26 | .24 | .30 | .22 | Hydrogen Peroxide, 100 vol, 140 lb cbys....lb. | .24 | .26 | .26 | .24 |
| .15 | .12 | .12 | .12 | Hypernic, 51°, 600 lb bbls....lb. | .12 | .15 | .15 | .12 |
| 1.30 | 1.28 | 1.28 | 1.20 | Indigo Madras, bbls....lb. | 1.28 | 1.30 | 1.30 | 1.28 |
| .18 | .15 | .15 | .18 | 20% paste, drums....lb. | .15 | .18 | .18 | .15 |
| .08 | .07½ | .07½ | .07½ | Solid, powder....lb. | .07½ | .08 | .08 | .07½ |
| | | | | Iron Chloride, see Ferric or Ferrous | | | | |
| .10 | .09 | .09 | .09 | Iron Nitrate, kegs....lb. | .09 | .10 | .10 | .09 |
| 3.25 | 2.50 | 2.50 | 2.50 | Coml, bbls....100 lb. | 2.50 | 3.25 | 3.25 | 2.50 |
| .12 | .10 | .10 | .10 | Oxide, English....lb. | .10 | .12 | .12 | .10 |
| .03¼ | .02½ | .02½ | .02½ | Red, Spanish....lb. | .02½ | .03¼ | .03¼ | .02½ |
| .90 | .85 | .85 | .85 | Isopropyl Acetate, 50 gal drs gal. | .85 | .90 | .90 | .85 |
| .20 | .17 | .29 | .17 | Japan Wax, 224 lb cases....lb. | ..... | .16 | .18 | .16 |
| 70.00 | 60.00 | 60.00 | 60.00 | Kieselguhr, 95 lb bgs NY....ton | 60.00 | 70.00 | 70.00 | 60.00 |
| ..... | ..... | 14.00 | 13.00 | Lead Acetate, bbls wks...100 lb. | 13.00 | 13.50 | 13.50 | 13.00 |
| 13.50 | 13.00 | 14.00 | 13.00 | White crystals, 500 lb bbls wks....100 lb. | 14.00 | 14.50 | 14.50 | 14.00 |
| .15 | .13 | .15½ | .13½ | Arsenate, drs 1c-1 wks....lb. | .13 | .15 | .15 | .13 |
| | | | | Dithiofuroate, 100 lb dr....lb. | ..... | 1.00 | | |
| 6.25 | 6.25 | 7.80 | 6.20 | Metal, c-1 NY....100 lb. | ..... | 7.75 | 7.75 | 6.10 |
| .14 | .14 | .14 | .14 | Nitrate, 500 lb bbls wks....lb. | ..... | .14 | .14 | .14 |
| .18 | .17½ | .17½ | .17½ | Oleate, bbls....lb. | .17½ | .18 | .18 | .17½ |
| .08¾ | .08½ | .10¾ | .08¾ | Oxide Litharge, 500 lb bbls.lb. | ..... | .08¾ | .08¾ | .08½ |
| .09¾ | .09½ | .11¼ | .09¾ | Red, 500 lb bbls wks....lb. | ..... | .09¾ | .09¾ | .09½ |
| .09 | .09 | .09¾ | .09 | White, 500 lb bbls wks...lb. | ..... | .09½ | .09½ | .09 |
| .08½ | .08½ | .09 | .08½ | Sulfate, 500 lb bbls wk...lb. | ..... | .08¾ | .08¾ | .08½ |
| | | | | Leuna saltpetre, bags c.i.f....ton | ..... | 53.50 | 53.50 | 52.00 |
| | | | | S. points c. i. f....ton | ..... | 53.80 | 53.80 | 52.30 |
| 4.50 | 4.50 | 4.50 | 4.50 | Lime, ground stone bags....ton | ..... | 4.50 | 4.50 | 4.50 |
| 1.05 | 1.05 | 1.05 | 1.05 | Live, 325 lb bbls wks...100 lb. | ..... | 1.05 | 1.05 | 1.05 |
| | | | | Lime Salts, see Calcium Salts | | | | |
| .17 | .15 | .15 | .15 | Lime-Sulfur soln bbls....gal. | .15 | .17 | .17 | .15 |
| .06½ | .06½ | .06½ | .06½ | Lithopone, 400 lb bbls 1c-1 wks....lb. | ..... | .05¾ | .06½ | .05¾ |
| .08½ | .08½ | .08½ | .08½ | Logwood, 51°, 600 lb bbls....lb. | .08½ | .08½ | .08½ | .08½ |
| .03½ | .03 | .03 | .03 | Chips, 150 lb bags....lb. | .03 | .03½ | .03½ | .03 |
| .12½ | .12½ | .12 | .12 | Solid, 50 lb boxes....lb. | ..... | .12½ | .12½ | .12½ |
| 27.00 | 26.00 | 26.00 | 26.00 | Sticks....ton | 24.00 | 26.00 | 26.00 | 24.00 |
| .08 | .07½ | .07½ | .07½ | Lower grades....lb. | .07½ | .08 | .08 | .07½ |
| .30 | .30 | .30 | .30 | Madder, Dutch....lb. | .22 | .25 | .25 | .22 |
| 50.00 | 48.00 | 48.00 | 48.00 | Magnesite, calc, 500 lb bbl...ton | 50.00 | 60.00 | 60.00 | 50.00 |
| | | | | **Magnesium** | | | | |
| .06½ | .06 | .06½ | .06 | Magnesium Carb, tech, 70 lb bags NY....lb. | .06 | .06½ | .06½ | .06 |

# Prices Current and Comment

**Purchasing Power of the Dollar: 1926 Avèrage--$1.00 - Jan. 1927 $1.042 - Jan. 1928 $1.047 - Nov. 1929 $1.076**

the West Coast, where it is being sold without regard for price, merely because foreign producers are extremely anxious to lighten their huge inventories. However, this condition is not expected to last much longer and it is thought that, when Foreign material is withdrawn, the sulfate price will go to a level more in keeping with the price of the metal. Most factors seem to look for no change in the metal price situation.

**Ethyl Acetate** — In view of the easier tendency in the acetic acid market and with a view towards stimulating demand, prices were lowered during the past month to a basis of 11.5c lb. in tanks and 11.8c @ 12.2c lb. in drums.

**Glycerine** — Although the market for crude has shown a slight flurry of activity during the past month, the market as a whole has been inactive and weak. Exports of glycerine from the United States for the nine months ended September 30, 1929, aggregated 1,115,079 pounds, valued at $151,859, as against 1,766,821 pounds with a value of $223,219 for the corresponding period of 1928. During the first nine months of 1929, imports of crude glycerine amounted to 12,964,628 pounds, valued at $752,628 compared with 1,811,081 pounds, with a value of $148, 208 in the corresponding period of 1928. Imports of refined glycerine totaled 4,887, 595 pounds, value $444,637 in the nine months of 1929 against 1,106,537 pounds, value $154,298 in this period of 1928.

**Gums** — All grades have been firm with stocks fairly short, but the market has been without price changes except in the case of sandarac. Supplies are limited and prices on this grade will probably continue their steady advance. Quotations are now at 40c lb. Kauri gum of average moderate quality and quantity was received into store by Auckland brokers during September. Supplies totaled 6,323 tons, a gain of six tons over the preceding month and 35 tons more than corresponding month of 1928. Market values remain stationary. Total receipts of gum into store for nine months of this year aggregated 2,844 tons as compared with 2,601 tons in 1928. August exports reached 291 tons, United States purchasing over 60 per cent of the total with balance pricipally to United Kingdom and Canada. As a result of the poor prices being obtained for kauri gum, Messrs. Whitley and Sons intend to close the Aranga gum field. The settlement has been in existence for 50 or 60 years, and gum worth hundreds of thousands of pounds has been won from the field. The diggers recently have been working at a depth of 14 feet, but owing to the low

| 1928 High | 1928 Low | 1927 High | 1927 Low | | Current Market | | 1929 High | 1929 Low |
|---|---|---|---|---|---|---|---|---|
| 37.00 | 27.00 | 37.00 | 37.00 | Chloride flake, 375 lb. drs c-1 wks ... ton | ..... | 36.00 | 36.00 | 36.00 |
| 33.00 | 33.00 | 33.00 | 33.00 | Important shipment ... ton | ..... | 33.00 | 33.00 | 33.00 |
| 31.00 | 31.00 | 31.00 | 31.00 | Fused, imp, 900 lb bbls NY ton | ..... | 31.00 | 31.00 | 31.00 |
| .10½ | .10 | .10 | .10 | Fluosilicate, crys, 400 lb bbls wks ... lb. | .10 | .10½ | .10½ | .10 |
| .42 | .42 | .42 | .42 | Oxide, USP, light, 100 lb bbls ... lb. | ..... | .42 | .42 | .42 |
| .50 | .50 | .50 | .50 | Heavy, 250 lb bbls ... lb. | ..... | .50 | .50 | .50 |
| ..... | ..... | ..... | ..... | Peroxide, 100 lb cs ... lb. | ..... | 1.25 | 1.25 | 1.25 |
| .10½ | .09¾ | .12½ | .09¾ | Silicofluoride, bbls ... lb. | .09¾ | .10½ | .10½ | .09¾ |
| .25 | .23 | .23 | .23 | Stearate, bbls ... lb. | .25 | .26 | .26 | .25 |
| .24 | .24 | .24 | .24 | Manganese Borate, 30%, 200 lb bbls ... lb. | ..... | .19 | .24 | .19 |
| .08½ | .08 | .08 | .08 | Chloride, 600 lb casks ... lb. | .08 | .08½ | .08½ | .08 |
| ..... | ..... | .05 | .04½ | Dioxide, tech (peroxide) drs lb. | .04½ | .06 | .06 | .04½ |
| .50 | .35 | ..... | ..... | Ore, powdered or granular | | | | |
| .03½ | .03 | .03 | .03 | 75-80%, bbls ... lb. | .03 | .03½ | .03½ | .03 |
| .04½ | .04 | .04 | .04 | 80-85%, bbls ... lb. | .04 | .04½ | .04½ | .04 |
| .05½ | .05 | .05 | .05 | 85-88%, bbls ... lb. | .05 | .05½ | .05½ | .05 |
| .07½ | .07 | .07 | .07 | Sulfate, 550 lb drs NY ... lb. | .08 | .08½ | .08½ | .08 |
| Nom. | .03½ | .03½ | .03½ | Mangrove 55%, 400 lb bbls ... lb. | .03½ | Nom. | Nom. | .03½ |
| 45.00 | 39.000 | 034.00 | 0 1 3. | Bark, African ... ton | ..... | 33.00 | 35.00 | 30.00 |
| 12.00 | 10.00 | 10.00 | 5 . | Marble Flour, bulk ... ton | 14.00 | 15.00 | 15.00 | 14.00 |
| | | | | Mercurous chloride ... lb. | ..... | 2.05 | 2.05 | 2.05 |
| 132.00 | 121.00 | 129 | 99.00 .00 | Mercury metal ... 75 lb flask | 124.00 | 125.00 | 126.00 | 120.00 |
| .74 | .72 | .72 | .72 | Meta-nitro-aniline ... lb. | .67 | .69 | .74 | .67 |
| 1.80 | 1.50 | 1.70 | 1.70 | Meta-nitro-para-toluidine 200 lb. bbls ... lb. | 1.50 | 1.55 | 1.55 | 1.50 |
| .94 | .90 | .90 | .90 | Meta-phenylene-diamine 300 lb. bbls ... lb. | .84 | .90 | .90 | .84 |
| .74 | .72 | .72 | .72 | Meta-toluene-diamine, 300 lb bbls ... lb. | .67 | .69 | .72 | .67 |

## Methanol

| 1928 High | 1928 Low | 1927 High | 1927 Low | | Current Market | | 1929 High | 1929 Low |
|---|---|---|---|---|---|---|---|---|
| | | | | Methanol, (Wood Alcohol), .... | | | | |
| .58 | .46 | .80 | .55 | 95% ... gal. | .51 | .53 | .66 | .51 |
| .60 | .47 | .87 | .57 | 97% ... gal. | .53 | .55 | .65 | .53 |
| .63 | .44 | ..... | ..... | Pure, ... gal. | .53 | .55 | .68 | .53 |
| .58 | .48 | ..... | ..... | Synthetic, drums c-1 ... gal. | .57 | .62 | .66 | .57 |
| .75 | .45 | .80 | .75 | Denat. gre. tanks ... gal. | .60 | .62 | .62 | .60 |
| .95 | .95 | .95 | .95 | Methyl Acetate, drums ... gal. | ..... | .95 | .95 | .95 |
| .90 | .68 | .88 | .75 | Acetone, 100 gal drums ... gal. | .83 | .85 | .85 | .83 |
| .95 | .85 | 1.00 | .85 | Anthraquinone, kegs ... lb. | .85 | .95 | .95 | .85 |
| ..... | ..... | ..... | ..... | Cellosolve, (See Ethylene Glycol Mono Methyl Ether) | ..... | ..... | .60 | .55 |
| 60 | .55 | .55 | .55 | Chloride, 90 lb cyl ... lb. | .55 | .60 | ..... | ..... |
| | | | | Furoate, tech., 50 gal. dr., .lb. | ..... | .50 | .50 | .50 |
| 80.00 | 65.00 | .03½ | .03½ | Mica, dry grd. bags wks ... lb. | 65.00 | 80.00 | 80.00 | 65.00 |
| 115.00 | 110.00 | .05½ | .05½ | Wet, ground, bags wks ... lb. | 110.00 | 115.00 | 115.00 | 110.00 |
| ..... | ..... | 3.00 | 3.00 | Michler's Ketone, kegs ... lb. | ..... | 3.00 | 3.00 | 3.00 |
| | | | | Monochlorobenzene, drums see, Chorobenzene, mono ... lb. | | | | |
| .75 | .70 | .70 | .70 | Monoethylorthotoluidin, drs. lb. | .70 | .75 | .75 | .70 |
| 4.20 | 3.95 | 3.95 | 3.95 | Monomethylparaminosufate 100 lb drums ... lb. | 3.95 | 4.20 | 4.20 | 3.95 |
| .07 | .06½ | .06½ | .06½ | Montan Wax, crude, bags ... lb. | .06½ | .07 | .07 | .06½ |
| .04½ | .04½ | .04 | .04 | Myrobalans 25%, liq bbls ... b | .04½ | .04½ | .04½ | .04½ |
| .08½ | .08 | .08 | .08 | 50% Solid, 50 lb boxes ... lb. | .08 | .08½ | .08½ | .08 |
| 50.00 | 42.00 | 43.50 | 41.00 | J1 bags ... ton | ..... | 41.00 | 43.00 | 40.00 |
| 40.00 | 32.50 | 37.00 | 23.50 | J 2 bags ... ton | ..... | 28.00 | 40.00 | 28.00 |
| 40.00 | 32.50 | 37.00 | 30.00 | R 2 bags ... ton | ..... | 28.00 | 34.00 | 28.00 |
| .18 | .18 | .21 | .18 | Naphtha, v. m. & p. (deodorized) bbls ... gal. | ..... | .16 | .18 | .16 |
| .06 | .05½ | .06 | .05½ | Naphthalene balls, 250 lb bbls wks ... lb. | ..... | .05½ | .05½ | .05½ |
| .04½ | .04½ | .04½ | .04½ | Crushed, chipped bgs wks ... lb. | ..... | .04½ | .04½ | .04½ |
| .05 | .05 | .05 | .04½ | Flakes, 175 lb bbls wks ... lb. | ..... | .05 | .05 | .05 |
| .24 | .21 | .21 | .21 | Nickel Chloride, bbls kegs ... lb. | .21 | .24 | .24 | .21 |
| .38 | .35 | .35 | .35 | Oxide, 100 lb kegs NY ... lb. | .37 | .40 | .40 | .37 |
| .09¾ | .09 | .09 | .08½ | Salt bbl. 400 bbls lb NY ... lb. | ..... | .13 | .13 | .13 |
| .09 | .08¾ | .08¾ | .08 | Single, 400 lb bbls NY ... lb. | ..... | .13 | .13 | .13 |
| 1.30 | 1.25 | 1.25 | 1.10 | Nicotine, free 40%, 8 lb tins, cases ... lb. | 1.25 | 1.30 | 1.30 | 1.25 |
| 1.20 | .98½ | 1.10 | 1.10 | Sulfate, 10 lb tins ... lb. | .98½ | 1.20 | 1.20 | .98½ |
| 14.00 | 13.00 | 13.00 | 13.00 | Nitre Cake, bulk ... ton | 14.50 | 18.00 | 18.00 | 12.00 |
| .10½ | .10½ | 10½ | .09½ | Nitrobenzene, redistilled, 1000 lb drs wks ... lb. | .10½ | .10½ | .10½ | .10½ |
| Nom. | .40 | .40 | .40 | Nitrocellulose, regular drums wks ... lb. | .40 | Nom. | Nom. | .40 |
| | | | | Low viscosity (soln only) | | | | |
| Nom. | .55 | .55 | .55 | Grade 1 drums, wks ... lb. | .55 | Nom. | Nom. | .55 |
| Nom. | .50 | .50 | .50 | Grade 2 drums, wks ... lb. | .50 | Nom. | Nom. | .50 |
| 4.00 | 3.35 | 3.60 | 3.35 | Nitrogenous Material, bulk ... unit | ..... | 3.50 | 4.00 | 3.50 |
| .25 | .25 | .25 | .25 | Nitronaphthalene, 550 lb bbls ... lb. | ..... | .25 | .25 | .25 |
| .15 | .14 | .14 | .14 | Nitrotoluene, 1000 lb drs wks ... lb. | .14 | .15 | .15 | .14 |
| Nom. | .25 | .25 | .25 | Nutgalls Aleppy, bags ... lb. | .16 | .16½ | .16½ | .16 |
| .18 | .17 | .17 | .17 | Chinese, bags ... lb. | .12 | .13 | .13 | .12 |
| .24 | .22 | .22 | .22 | Powdered, bags ... lb. | .22 | .24 | .24 | .22 |
| .03½ | .03½ | .03½ | .03½ | Oak, tanks, wks ... lb. | ..... | .03½ | .03½ | .03½ |
| .04½ | .04 | .04 | .04 | 23-25% liq., 600 lb bbl wk lb. | .04 | .04½ | .04½ | .04 |
| 50.00 | 45.00 | 45.00 | 45.00 | Oak Bark, ground ... ton | 30.00 | 35.00 | 50.00 | 30.00 |
| 23.00 | 20.00 | 20.00 | 20.00 | Whole ... ton | 20.00 | 23.00 | 23.00 | 20.00 |
| .13½ | .13 | .14½ | .13 | Orange-Mineral, 1100 lb casks NY ... lb. | .12½ | .13½ | .13½ | .12½ |
| 2.25 | 2.20 | 2.20 | 2.20 | Orthoaminophenol, 50 lb kgs ... lb. | 2.20 | 2.25 | 2.25 | 2.20 |
| 2.50 | 2.35 | 2.50 | 2.35 | Orthoanisidine, 100 lb drs ... lb. | 2.50 | 2.60 | 2.60 | 2.50 |
| .65 | .50 | .50 | .50 | Orthochlorophenol, drums ... lb. | .50 | .65 | .65 | .50 |
| .28 | .18 | .18 | .18 | Orthocresol, drums ... lb. | .18 | .28 | .28 | .18 |
| .07 | .06 | .06 | .06 | Orthodichlorobenzene, 1000 lb drums ... lb. | .07 | .10 | .10 | .07 |
| .35 | .32 | .32 | .32 | Orthonitrochlorobenzene, 1200 lb drs wks ... lb. | 30 | .33 | .33 | .30 |

# Prices Current and Comment

**Purchasing Power of the Dollar: 1926 Average--$1.00 - Jan. 1927 $1.042 - Jan. 1928 $1.047 - Nov. 1929 $1.076**

prices it is considered more profitable to leave the gum in the ground.

**Mercury** — Of chief interest during the past month has been the upward revision in prices made by the trust. Current quotations now range from $124.30 @ $125.25 flask depending upon quantity. As stocks in the hands of the English brokers are declining rapidly, the trust is becoming all powerful and it seems quite likely that the price tendency will be gradually upward, governed only by the presence or lack of demand.

**Methanol** — Except for the denatured grade, this material is holding up surprisingly well, and there has been as yet no sign of any great slackening of demand. September production of crude methanol totaled 598,548 gallons, as compared with 656,414 gallons for August and 495,555 gallons during September last year. For the nine months methanol production amounted to 6,166,367 gallons, compared with 5,420,803 gallons for the same period last year. Stocks of crude methanol at plants at the end of the month were 256,356 gallons and at refineries and in transit 514,572 gallons. These figures for the corresponding time last year were, respectively, 229,683 gallons and 164,972 gallons. Refined methanol production during September was 432,094 gallons, against 454,150 gallons at the end of August and 355,353 gallons at the end of September last year. For the nine months 3,933,173 gallons, against 4,290,945 gallons during the same nine months of 1928. Shipments of refined for the year to the end of September 4,433,016 gallons, against 4,441,365 gallons during the same time last year. Stocks of refined at the end of September 729,932 gallons, against 783,674 gallons at the close of August and 300,478 at the end of September last year, according to the Department of Commerce.

**Phenol** — Shipments have been reported to be going out more freely although there still exists some scarcity for spot material. Prices are firm and unchanged with no promise of any revision of any sort.

**Salt Cake** — Continues to be in tight position so that prices have advanced on both grades. The scarcity of the white material is creating new users of the chrome so that this too is considerably higher in price. Imports of salt cake for the first nine months of 1929 were 75,426 tons, which approaches three times the total imports of 1928, of 28,228 tons, and is at the rate of about 100,000 tons for the entire year. This reflects the continued growth in recent years in American imports of this commodity, from a figure of 1,913 tons in 1925 and 11,171 tons in 1927 to 75,426 tons for the nine months of this

| 1928 High | 1928 Low | 1927 High | 1927 Low | | Current Market | | 1929 High | 1929 Low |
|---|---|---|---|---|---|---|---|---|
| .18 | .17 | .13 | .13 | Orthonitrotoluene, 1000 lb drs wk....lb. | .17 | .18 | .18 | .17 |
| .90 | .85 | .85 | .85 | Orthonitrophenol, 350 lb dr...lb. | .85 | .90 | .90 | .85 |
| .31 | .29 | .29 | .25 | Orthotoluidine, 350 lb bbl 1c-1 lb. | .25 | 30 | .30 | .25 |
| .75 | .70 | 70 | .70 | Orthonitroparachlorphenol, tins ....lb. | .70 | .75 | .75 | .70 |
| .17 | .16 | .16 | .16 | Osage Orange, crystals.......lb. | .16 | .17 | .17 | .16 |
| .07 | .07 | .07 | .07 | 51 deg. liquid.............lb. | .07 | .07½ | .07½ | .07 |
| .15 | .14½ | .14½ | .14½ | Powdered, 100 lb bags.....lb. | .14½ | .15 | .15 | .14½ |
| | | | | Paraffin, refd, 200 lb cs slabs | | | | |
| .06¾ | .06½ | .06½ | .06½ | 123-127 deg. M. P.........lb. | .06 | .06½ | .06¾ | .06½ |
| .07¾ | .07½ | .07½ | .07½ | 128-132 deg. M. P.........lb. | .06½ | .06¾ | .07 | .06½ |
| .08½ | .08 | .08 | .08 | 133-137 deg. M. P. .......lb. | .07½ | .07¾ | .07¾ | .07½ |
| .10 | .08¾ | .08¾ | .08¾ | 138-140 deg. M. P.........lb. | .08 | .09 | .09 | .08 |
| .28 | .20½ | .29 | .26 | Para Aldehyde, 110-55 gal drs..lb. | .20½ | .23 | .28 | .20½ |
| 1.05 | 1.00 | 1.00 | 1.00 | Aminoacetanilid, 100 lb bg..lb. | 1.00 | 1.05 | 1.05 | 1.00 |
| 1.30 | 1.25 | 1.25 | 1.25 | Aminohydrochloride, 100 lb kegs....lb. | 1.25 | 1.30 | 1.30 | 1.25 |
| 1.15 | 1.15 | 1.15 | 1.15 | Aminophenol, 100 lb kegs..lb. | .99 | 1.02 | 1.15 | .99 |
| .65 | .50 | .50 | .50 | Chlorophenol, drums......lb. | .50 | .65 | .65 | .50 |
| ..... | ..... | .12 | .12 | Coumarone, 330 lb drums..lb. | ..... | ..... | ..... | ..... |
| 2.50 | 2.25 | 2.25 | 2.25 | Cymene, refd, 110 gal dr..gal. | 2.25 | 2.50 | 2.50 | 2.25 |
| .20 | .17 | .17 | .17 | Dichlorobenzene, 150 lb bbls wks....lb. | .17 | .20 | .20 | .17 |
| .55 | .50 | .53 | .50 | Nitroacetanilid, 300 lb bbls.lb. | .50 | .55 | .55 | .50 |
| .59 | .48 | .52 | .52 | Nitroaniline, 300 lb bbls wks ....lb. | .48 | .59 | .49 | .48 |
| .32 | .32 | .32 | .32 | Nitrochlorobenzene, 1200 lb drs wks....lb. | .23 | .26 | .26 | 23 |
| 2.85 | 2.75 | 2.75 | 2.75 | Nitro-orthotoluidine, 300 lb bbls....lb. | 2.75 | 2.85 | 2.85 | 2.75 |
| .55 | .50 | .50 | .50 | Nitrophenol 185 lb bbls....lb. | .50 | .55 | .55 | .50 |
| .94 | .92 | .92 | .92 | Nitrosodimethylaniline, 120 lb. bbls....lb. | .92 | .94 | .94 | .92 |
| .30 | .30 | .30 | .25 | Nitrotoluene, 350 lb bbls....lb. | .30 | .31 | .31 | .30 |
| 1.20 | 1.15 | 1.20 | 1.15 | Phenylenediamine, 350 lb bbls ....lb. | 1.15 | 1.20 | 1.20 | 1.15 |
| .41 | .40 | .40 | .40 | Tolueneulfonamide, 175 lb bbls....lb. | .70 | .75 | .75 | .70 |
| .22 | .20 | .20 | .18 | Toluenesulfonchloride, 410 lb bbls wks....lb. | .20 | .22 | .22 | .20 |
| .42 | .40 | .45 | .38 | Toluidine, 350 lb bbls wk...lb. | .40 | .42 | .42 | .40 |
| | | | | Paris Green, Arsenic Basis | | | | |
| .25 | .20 | .21 | .21 | 100 lb kegs..............lb. | ..... | .27 | .27 | .25 |
| .23 | .17 | .19 | .19 | 250 lb kegs..............lb. | ..... | .25 | .25 | .23 |
| ..... | ..... | .25 | .25 | Persian Berry Ext., bbls.....lb. | .25 | Nom. | .25 | .25 |
| .03 | .02½ | .02½ | .02½ | Petrolatum, Green, 300 lb bbl.lb. | .02 | .02½ | .02½ | .02 |
| .13 | .20 | .18 | .16 | Phenol, 250-100 lb drums.....lb. | .14½ | .15 | .16 | 13 |
| 1.35 | 1.35 | 1.35 | 1.28 | Phenyl - Alpha - Naphthylamine, 100 lb kegs.............lb. | ..... | 1.35 | 1.35 | 1.35 |

## Phosphate

| 1928 High | 1928 Low | 1927 High | 1927 Low | | Current Market | | 1929 High | 1929 Low |
|---|---|---|---|---|---|---|---|---|
| | | | | Phosphate Acid (see Superphosphate) | | | | |
| | | | | Phosphate Rock, f.o.b. mines | | | | |
| 3.15 | 3.00 | 3.00 | 3.00 | Florida Pebble, 68% basis..ton | 3.00 | 3.15 | 3.15 | 3.00 |
| 3.65 | 3.50 | 3.50 | 3.50 | 70% basis.............ton | 3.75 | 4.00 | 4.00 | 3.50 |
| 4.15 | 4.00 | 4.00 | 3.85 | 72% basis.............ton | 4.25 | 4.50 | 4.50 | 4.00 |
| 5.00 | 5.00 | 5.35 | 5.00 | 75-74% basis..........ton | 5.25 | 5.50 | 5.50 | 5.00 |
| 5.75 | 5.75 | 5.75 | 5.60 | 75% basis.............ton | ..... | 5.75 | 5.75 | 5.75 |
| 6.25 | 6.25 | 6.25 | 6.00 | 77-76% basis..........ton | ..... | 6.25 | 6.25 | 6.25 |
| 5.00 | 5.00 | 5.50 | 5.00 | Tennessee, 72% basis.....ton | ..... | 5.00 | 5.00 | 5.00 |
| .40 | .35 | .35 | .35 | Phosphorous Oxychloride 175 lb cyl....lb. | .20 | .25 | .40 | .20 |
| .65 | .60 | .65 | .60 | Red, 110 lb cases........lb. | .37½ | .42 | .60 | .37½ |
| .32 | .32 | .32 | .32 | Yellow, 110 lb cases wks..lb. | .31 | .37½ | .32 | .31 |
| .46 | .46 | .46 | .46 | Sesquisulfide, 100 lb cs.....lb. | ..... | .44 | .46 | .44 |
| ..... | ..... | .35 | .35 | Trichloride, cylinders......lb. | .20 | .25 | .35 | .20 |
| .20 | .18 | .18 | .18 | Phthalic Anhydride, 100 lb bbls wks....lb. | .18 | .20 | .20 | .18 |
| 45.00 | 37.00 | 40 00 | 37.00 | Pigments Metallic, Red or brown bags, bbls, Pa. wks.....ton | 37.00 | 45.00 | 45.00 | 37.00 |
| | | | | Pine Oil, 55 gal drums or bbls | | | | |
| .64 | .63 | .63 | .63 | Destructive dist...........lb. | .63 | .64 | .64 | .63 |
| 10.60 | 8.00 | 8.00 | 8.00 | Prime bbls..............bbl. | 8.00 | 10.60 | 10.60 | 8.00 |
| .70 | .70 | .70 | .66 | Steam dist. bbls..........gal. | .65 | .70 | .70 | .65 |
| 45.00 | 40.00 | 40.00 | 40.00 | Pitch Hardwood,.............. wks....ton | 40.00 | 45.00 | 45.00 | 40.00 |
| 3.30 | 3.30 | 3.30 | 3.30 | Plaster Paris, tech, 250 lb bbls ....bbl. | 3.30 | 3.50 | 3.50 | 3.30 |

## Potash

| 1928 High | 1928 Low | 1927 High | 1927 Low | | Current Market | | 1929 High | 1929 Low |
|---|---|---|---|---|---|---|---|---|
| .07½ | .07½ | .07½ | .07½ | Potash, Caustic, wks, solid...lb. | .06½ | .06¾ | .07½ | .06½ |
| .07½ | .07½ | .07½ | .07½ | flake.................lb. | .0705 | .08 | .07½ | .0705 |
| | | | | Potash Salts, Rough Kainit | | | | |
| 9.00 | 9.00 | 9.00 | 9.00 | 12.4% basis bulk.......ton | ..... | 9.10 | 9.10 | 9.00 |
| 9.50 | 9.50 | 9.50 | 9.50 | 14% basis.............ton | ..... | 9.60 | 9.60 | 9.50 |
| | | | | Manure Salts................. | | | | |
| 12.40 | 12.40 | 12.40 | 12.40 | 20% basis bulk.........ton | ..... | 12.50 | 12.50 | 12.40 |
| 18.75 | 18.75 | 18.75 | 18.75 | 30% basis bulk.........ton | ..... | 18.95 | 18.95 | 18.75 |
| 36.40 | 36.40 | 36.40 | 36.40 | Potassium Muriate, 80% basis bags....ton | ..... | 36.75 | 36.75 | 36.40 |
| 27.00 | 27.00 | 27.00 | 27.00 | Pot. & Mag. Sulfate, 48% basis bags....ton | ..... | 27.50 | 27.50 | 27.00 |
| 47.30 | 47.30 | 47.30 | 47.30 | Potassium Sulfate, 90% basis bags....ton | ..... | 47.75 | 47.75 | 47.30 |
| .09½ | .09 | .09 | .09 | Potassium Bicarbonate, USP, 320 lb bbls....lb. | .13 | .14 | .14 | .13 |
| .09¼ | .08½ | .08½ | .08 | Bichromate Crystals, 725 lb casks....lb. | .09 | .09¼ | .09¼ | .09 |
| .12¾ | .12 | .12 | .11 | Powd., 725 lb cks wks....lb. | .13 | .13¾ | .13¾ | .13 |

# Prices Current and Comment

**Purchasing Power of the Dollar: 1926 Average--$1.00 - Jan. 1927 $1.042 - Jan. 1928 $1.047 - Nov. 1929 $1.076**

year. It is estimated that in 1927 the United States imports of German salt cake represented about 8 per cent of Germany's total exports, 20 per cent in 1928, and present figures indicate approximately 45 per cent for 1929.

**Soda Ash** — Renewal contracts for the month of November are reported as being slightly ahead of last year at this time. The only decline is noted in the demand for ash for flat glass, and this is expected to be overcome with the starting of the projected construction programs throughout the country. Exports of soda ash and sal soda for the first three-quarters of 1929 were 27,733 and 4,741 tons, respectively. This trade combined was 32,474 tons, valued at $1,097,910, against 24,262 tons, valued at $930,080 in the corresponding period of 1928. The increased tonnage is equivalent to approximately one-fourth. In addition to the above 7,246 tons of modified sodas were exported in this period of the current year with a value of nearly $400,000. This class is shown separately for the first time, covering 1929, and includes combinations of soda ash and caustic soda or soda ash and bicarbonate.

**Soda Caustic** — Contract renewals are reported as being from two ot three per cent ahead of last year's November renewals. As a general indication of confidence of industry generally throughout the country, this is probably unsurpassed. It is especially remarkable in view of the general hesitancy to make any commitments for 1930, and shows that industry generally is moving ahead on a sound basis. There has been no curtailment of standing orders for shipment and deliveries continue to be up to and ahead of forecast based on those of previous years.

**Sodium Chlorate** — Continues to be very firm with every indication of heavy demand and perhaps higher prices for next year. Imports for the first eight months of 1928 totaled nearly 3,000 tons valued at about $240,000. This represents about 2½ times the 1928 total of 1,297 tons, valued at $96,025, which in turn was a great increase over total imports for 1927 to 764 tons, valued at $55,237. The greatly increased consumption is due to its growing use as a weed eradicator.

**Sodium Nitrate** — Is reported as being firm and in good demand, with a tendency towards higher prices. This is probably the only member of the fertilizer group of which this can be said at the present time. Stocks in Chile as of October 31 were 1,093,000 tons, as compared with 922,000 tons at the same time

| 1928 High | 1928 Low | 1927 High | 1927 Low | | Current Market | | 1929 High | 1929 Low |
|---|---|---|---|---|---|---|---|---|
| .17 | .16 | .16 | .16 | Binoxiate, 300 lb bbls......lb. | .16 | .17 | .17 | .16 |
| .30 | .30 | .30 | .30 | Bisulfate, 100 lb kegs......lb. | ..... | .30 | .30 | .30 |
| .05¾ | .05⅝ | .05⅝ | .05⅝ | Carbonate, 80-85% calc. 800 lb casks..............lb. | .05⅝ | .05¾ | .05¾ | .05⅝ |
| .09 | .06½ | .08½ | .08½ | Chlorate crystals, powder 112 lb keg wks...........lb. | .08½ | .09 | .09 | .08½ |
| .08½ | .07¾ | .08¾ | .08½ | Imported 112 lb kegs NY............lb... | .07½ | .07¾ | .07¾ | .07½ |
| .05½ | .05⅝ | .05⅝ | .05⅝ | Chloride, crys bbls.........lb. | .05⅝ | .05½ | .05½ | .05⅝ |
| .28 | .27 | .27 | .27 | Chromate, kegs...........lb. | .27 | .28 | .28 | .27 |
| .57½ | .55 | .55 | .55 | Cyanide, 110 lb. cases.....lb. | .55 | .57½ | .57½ | .55 |
| .12 | .11½ | .11½ | .11½ | Metabisulfite, 300 lb. bbl...lb. | .12 | .13 | .13 | .11½ |
| .17 | .16 | .16 | .16 | Oxalate, bbls..............lb. | .20 | .24 | .24 | .16 |
| .12 | .11 | .11 | .11 | Perchlorate, casks wks.....lb. | .11 | .12 | .12 | .11 |
| .15½ | .15 | .15½ | .14½ | Permanganate, USP, crys 500 & 100 lb drs wks........lb. | .16 | .16½ | .16½ | .16 |
| .38 | .37 | .39 | .37½ | Prussiate, red, 112 lb keg...lb. | .38 | .40 | .40 | .38 |
| .18½ | .18 | .18 | .18 | Yellow, 500 lb casks.....lb. | .18½ | .21 | .21 | .18½ |
| .51 | .51 | .51 | .51 | Tartrate Neut, 100 lb keg..lb. | ..... | .21 | .51 | .51 |
| .25 | .25 | .25 | .25 | Titanium Oxalate, 200 lb bbls ........................lb. | .21 | .23 | .25 | .21 |
| ..... | ..... | ..... | .. .. | Propyl Furoate, 1 lb tins.....lb. | ..... | 5.00 | 5.00 | 5.00 |
| .05 | .04 | .04 | .04 | Pumice Stone, lump bags.....lb. | .04 | .05 | .05 | .04 |
| .06 | .04½ | .04½ | .04½ | 250 lb bbls..............lb. | .04½ | .06 | .06 | .04½ |
| .03 | .02½ | .02½ | .02½ | Powdered, 350 lb bags.....lb. | .02½ | .03 | .03 | .02½ |
| .03¼ | .03¼ | 3.75 | 3.75 | Putty, commercial, tubs..100 lb. | ..... | .03¼ | .03¼ | .03¼ |
| .05½ | .05½ | 5.50 | 5.50 | Linseed Oil, kegs......100 lb. | ..... | .05½ | .05½ | .05½ |
| 1.50 | 1.50 | 3.00 | 1.50 | Pyridine, 50 gal drums......gal. | ..... | 1.75 | 1.75 | 1.50 |
| .13 | .13 | .13 | .12 | Pyrites, Spanish cif Atlantic ports bulk.............unit | .13 | .13¾ | .13¾ | .13 |
| .04 | .03 | .03 | .03 | Quebracho, 35% liquid tks....lb. | .03½ | .04 | .04 | .03½ |
| .04 | .03½ | .03½ | .03½ | 450 lb bbls c-1..........lb. | .03¾ | .04¼ | .04¼ | .03¾ |
| .05 | .04 | .04 | .04 | 35% Bleaching, 450 lb bbl .lb. | .04¼ | .05¼ | .04¼ | .05¼ |
| .05 | .05 | .05 | .04⅞ | Solid, 63%, 100 lb bales cif..lb. | .05 | .05½ | .05¾ | .05¼ |
| .05 | .05 | .05 | .05 | Clarified, 64%, bales.....lb. | ..... | .5⅝ | .05⅝ | .05⅝ |
| .06 | .05½ | .06½ | .06½ | Quercitron, 51 deg liquid 450 lb bbls.................lb. | .05½ | .06 | .06 | .05½ |
| .13 | .10 | .10 | .10 | Solid, 100 lb boxes.........lb. | .10 | .13 | .13 | .10 |
| 14.00 | 14.00 | 14.00 | 14.00 | Bark, Rough...........ton | ..... | 14.00 | 14.00 | 14.00 |
| 35.00 | 34.00 | 34.00 | 34.00 | Ground.................ton | 34.00 | 35.00 | 35.00 | 34.00 |
| .46 | .45 | .45 | .45 | R Salt, 250 lb bbls wks......lb. | .45 | .46 | .46 | .45 |
| ..... | ..... | .18 | .18 | Red Sanders Wood, grd bbls..lb. | ..... | .18 | .18 | .18 |
| 1.35 | 1.25 | 1.25 | 1.25 | Resorcinol Tech, cans........lb. | 1.15 | 1.25 | 1.25 | 1.15 |
| .57 | .57 | .67 | .57 | Rosin Oil, 50 gal bbls, first run ......................gal. | ..... | .62 | .62 | .57 |
| .62 | .62 | 72 | .62 | Second run............gal. | ..... | .64 | .64 | .62 |
| | | | | **Rosin** | | | | |
| | | | | Rosins 600 lb bbls 280 lb...unit | | | | |
| 9.75 | 8.20 | 13.00 | 8.50 | B........................ | ..... | 8.70 | 9.25 | 7.45 |
| 9.80 | 8.25 | 13.00 | 8.50 | D........................ | ..... | 8.70 | 9.25 | 7.70 |
| 9.95 | 8.60 | 13.15 | 8.50 | E........................ | ..... | 8.72 | 9.27 | 8.30 |
| 10.10 | 8.65 | 13.20 | 8.50 | F........................ | ..... | 8.75 | 9.27 | 8.40 |
| 10.10 | 8.75 | 13.25 | 8.50 | G........................ | ..... | 8.75 | 9.45 | 8.40 |
| 10.10 | 8.75 | 13.30 | 8.50 | H........................ | ..... | 8.75 | 9.50 | 8 40 |
| 10.15 | 8.80 | 13.35 | 8.55 | I........................ | ..... | 8.75 | 9.50 | 8.40 |
| 10.15 | 8.85 | 14.80 | 8.65 | K........................ | ..... | 8.75 | 9.55 | 8.45 |
| 10.30 | 8.85 | 15.00 | 8.80 | M........................ | ..... | 8.80 | 9.85 | 8.50 |
| 11.00 | 9.15 | 15.85 | 9.15 | N........................ | ..... | 8.95 | 10.30 | 8.93 |
| 11.65 | 10.15 | 16.60 | 10.50 | WG...................... | ..... | 9.30 | 11.30 | 9.00 |
| 12.65 | 10.40 | 18.55 | 12.00 | WW...................... | ..... | 9.75 | 12.30 | 9.30 |
| 30.00 | 24.00 | 24.00 | 24.00 | Rotten Stone, bags mines....ton | 24.00 | 30.00 | 30.00 | 24.00 |
| .08 | .07 | .07 | .07 | Lump, imported, bbls......lb. | .07 | .08 | .08 | .07 |
| .12 | .09 | .09 | .09 | Selected bbls............lb. | .09 | .12 | .12 | .09 |
| .05 | .02 | .02 | .02 | Powdered, bbls............lb. | .02 | .05 | .05 | .02 |
| .05 | .04½ | .04½ | .04½ | Sago Flour, 150 lb bags......lb. | .04½ | .05 | .05 | .04½ |
| ..... | ..... | .90 | .90 | Sal Soda, bbls wks.......100 lb. | ..... | 1.00 | 1.00 | 1.00 |
| 20.00 | 19.00 | 19.00 | 19.00 | Salt Cake, 94-96% c-1 wks. .ton | 20.00 | 24.00 | 24 00 | 19.00 |
| 17.00 | 15.00 | 15.00 | 15.00 | Chrome ...............ton | 20.00 | 21.00 | 21.00 | 12.00 |
| .06½ | .06½ | .06½ | .06½ | Saltpetre, double refd granular 450-500 lb bbls.........lb. | .06½ | .06½ | .06½ | .06½ |
| .01½ | .01½ | .01½ | .01½ | Satin, White, 500 lb bbls.....lb | ..... | .01½ | .01½ | .01½ |
| .62½ | .49 | .66 | .47 | Shellac Bone dry bbls........lb. | ..... | .52 | .61 | .52 |
| .55 | .45 | .57 | .41 | Garnet, bags.............lb. | .. .. | .43 | .45 | .43 |
| .58 | .47 | .65 | 40 | Superfine, bags............lb. | ..... | .44 | .47 | .44 |
| .55 | .42 | .37 | .57 | T. N. bags...............lb. | ..... | .40 | .44 | .40 |
| .57 | .53 | .50 | .50 | Schaeffer's Salt, kegs.........lb. | .53 | .57 | .57 | .53 |
| 11.00 | 8.00 | 6.00 | 6.00 | Silica, Crude, bulk mines....ton | 8.00 | 11.00 | 11.00 | 8.00 |
| 30.00 | 22.00 | 15.00 | 15.00 | Refined, floated bags......ton | 22.00 | 30.00 | 30.00 | 22.00 |
| ..... | ..... | 32.00 | 32.00 | Air floated bags........ton | ..... | 32.00 | 32.00 | 32.00 |
| 40.00 | 32.00 | 55.00 | 55.00 | Extra floated bags......ton | 32.00 | 40.00 | 40.00 | 32.00 |
| 22.00 | 15.00 | 15.00 | 15.00 | Soapstone, Powdered, bags f. o. b. mines.................ton | 15.00 | 22.00 | 22.00 | 15.00 |
| | | | | **Soda** | | | | |
| 1.40 | 1.40 | 1.32½ | 1.32½ | Soda Ash, 58% dense, bags c-1 wks................100 lb. | ..... | 1.40 | 1.40 | 1.40 |
| 2.29 | 2.40 | 2.14 | 2.04 | 58% light, bags.......100 lb. | ..... | 1.34½ | 1.34½ | 1.34½ |
| 1.32½ | 1.32½ | 1.32½ | 1.32½ | Contract, bags c-1 wks. 100 lb. | ..... | 1.32 | 1.32 | 1.32 |
| 4.21 | 4.16 | 4.16 | 4.06 | Soda Caustic, 76% grnd & flake drums..............100 lb. | ..... | 3.35 | 3.35 | 3.35 |
| 3.91 | 3.76 | 3.76 | 3.66 | 76% solid drs.........100 lb. | ..... | 2.95 | 2.95 | 2.95 |
| 3.00 | 3.00 | 3.00 | 3.00 | Contract, c-1 wks......100 lb. | ..... | 2.90 | 2.90 | 2.90 |
| .05 | .04½ | .04½ | .04½ | Sodium Acetate, tech....450 lb. bbls wks...............lb. | .04¾ | .05¼ | .06¼ | .04¾ |
| ..... | ..... | .19 | .18 | Arsenate, drums...........lb. | .18 | .19 | .19 | .18 |
| ..... | ..... | 1.00 | 1.00 | Arsenite, drums...........gal. | 1.00 | 1.50 | 1.50 | 1.00 |
| 2.41 | 2.41 | 2.41 | 2.41 | Bicarb, 400 lb bbl NY..100 lb. | ..... | 2.41 | 2.41 | 2.41 |

# Prices Current and Comment

**Purchasing Power of the Dollar: 1926 Average--$1.00 - Jan. 1927 $1.042 - Jan. 1928 $1.047 - Nov. 1929 $1.076**

last year, and 652,000 tons in 1927. Total supply in sight as of October 31, amounted to 2,258,000 tons as compared with 1,805,500 tons in 1928, and 1,340,000 tons in 1927. Seventy oficinas in operation in September, 1929, produced 253,200 metric tons of nitrate of soda compared with 259,400 tons during September of the previous year. Exports for September amounted to 252,000 metric tons against 171,800 during the same month in 1928.

**Sodium Sulfide** — It is reported that an increasing scarcity exists in this market due to the fact that previously existing low prices over a long period resulted in curtailed production. Demand is heavy from both the tanning and textile fields and the market is said to be in very strong position.

**Toluene** — Curtailment of automobile of automobile production has made itself felt in this market and but little improvement is looked for until work is started on new models.

**Turpentine** — Heavy receipts and slack demand have combined to bring lower prices during the past month so that quotations on spirits are now at 53c @ 59c gal. while steam distilled is at 50c gal.

**Valonia** — Has been in slack demand while recent arrivals have increased stocks. Prices are lower at $42.00 per ton on beard, and $30.00 per ton on cups.

## OILS AND FATS

**Chinawood Oil** — Has fallen off considerably during the past month so that tanks are now 1½ c lb. lower in price at the Coast being quoted at 12½c lb. New York prices are correspondingly lower with tanks at 13¼c lb. and barrels at 15½c lb. This weakening of the market is attributed to two or three causes. One is of course the unsettled status of the tariff with regard to this oil. Producers and consumers alike are, with reason, uncertain of the future of the market in the face of a possible 5c increase in duty. In the second place, there are already indications of somewhat slackened demand from the paint and varnish trades, which factor has also contributed to the poor position of the market. A third contributing cause is probably the decisive decline in linseed oil prices during the past month. The importation of this commodity continues to be in excess of last year's figures. September imports totaled 16,593,454 pounds, valued at $2,115,364, as against 13,545,996 pounds, valued at $1,638,109 for last year. For nine months of this year the total quantity was 93,932,116 pounds, valued at $11 761,618 as compared with 81,852,336

| 1928 High | 1928 Low | 1927 High | 1927 Low | | Current Market | | 1929 High | 1929 Low |
|---|---|---|---|---|---|---|---|---|
| .07 | .06½ | .06½ | .06½ | Bichromate, 500 lb cks wks.lb. | .07½ | .07¾ | .07¾ | .07½ |
| .04 | .04 | .08¾ | .08¾ | Bisulfite, 500 lb bbl wks....lb. | ..... | .04 | .04 | .04 |
| 1.35 | 1.30 | 1.30 | 1.30 | Carb. 350 lb bbls NY..100 lb. | 1.30 | 1.35 | 1.35 | 1.30 |
| .06¾ | .05¾ | .06½ | .06½ | Chlorate, .......... wks..lb. | .07½ | .08 | .11 | .06½ |
| 13.00 | 12.00 | 12.00 | 12.00 | Chloride, technical........ton | 12.00 | 13.00 | 13.00 | 12.00 |
| .20 | .20 | .20 | .20 | Cyanide, 96-98%, 100 & 250 lb drums wks..........lb. | .18 | .20 | .20 | .18 |
| .09 | .08¾ | .08¾ | .08¾ | Fluoride, 300 lb bbls wks...lb. | .08¾ | .09 | .09 | .08¾ |
| .24 | .22 | .22 | .22 | Hydrosulfite, 200 lb bbls f. o. b. wks................lb. | .22 | .24 | .24 | .22 |
| .05 | .05 | .05 | .05 | Hypochloride solution, 100 lb cbys.................lb. | ..... | .05 | .05 | .05 |
| 3.05 | 2.65 | 2.65 | 2.65 | Hyposulfite, tech, pea cyrs 375 lb bbls wks......100 lb. | 2.65 | 3.05 | 3.05 | 2.65 |
| 2.65 | 2.40 | 2.40 | 2.40 | Technical, regular crystals 375 lb bbls wks....100 lb. | 2.40 | 2.65 | 2.65 | 2.40 |
| .45 | .45 | .70 | .45 | Metanilate, 150 lb bbls.... lb. | ..... | .45 | .45 | .45 |
| ..... | ..... | .02½ | .02½ | Monohydrate, bbls........lb. | ..... | .02½ | .02½ | .02½ |
| .57 | .55 | .55 | .55 | Naphthionate, 300 lb bbl...lb. | .55 | .57 | .57 | .55 |
| 2.45 | 2.12½ | 2.67 | 2.25 | Nitrate, 92%, crude, 200 lb bags c-1 NY......100 lb. | 2.12 | 2. 9½ | 2.22½ | 2.09 |
| .08½ | .07½ | .08¾ | .08 | Nitrite, 500 lb bbls spot....lb. | .07½ | .08 | .08 | .07½ |
| .27 | .25 | .25 | .25 | Orthochlorotoluene, sulfonate, 175 lb bbls wks.......lb. | .25 | .27 | .27 | .25 |
| .23 | .20 | .20 | .20 | Oxalate Neut, 100 lb kegs..lb. | .37 | .42 | .42 | .37 |
| 3.90 | 3.90 | 3.90 | 3,90 | Paratoluene, tri-sodium, tech. 100 lb bbls c-1....100 lb. | ..... | 3.90 | 3.90 | 3.90 |
| .09 | .08 | .08 | .08 | Sulfonate, 175 lb bbls....lb. | .08 | .09 | .09 | .08 |
| .22 | .21 | .21 | .21 | Perborate, 275 lb bbls.....lb. | .18 | .20 | .22 | .18 |
| 3.55 | 3.25 | 3.25 | 3.25 | Phosphate, di-sodium, tech. 310 lb bbls.......100 lb. | 3.25 | 3.55 | 3.55 | 3.25 |
| ..... | ..... | ..... | ..... | tri-sodium, tech, 325 lb bbls...............100 lb. | 3.90 | 4.00 | 4.00 | 3.90 |
| .72 | .69 | .69 | .69 | Picramate, 100 lb kegs.....lb. | .69 | .72 | .72 | .69 |
| .12½ | .12 | .12 | .11 | Prussiate, Yellow, 350 lb bbl wks................lb. | .12 | .12½ | .12½ | .12 |
| .14 | .13½ | .13½ | .13½ | Pyrophosphate, 100 lb keg..lb. | .15 | .20 | .20 | .15 |
| 1.45 | 1.20 | 1.20 | 1.20 | Silicate, 60 deg 55 gal drs, wks ..............100 lb. | ..... | 1.65 | 1.65 | 1.65 |
| 1.10 | .85 | .85 | .85 | 40 deg 55 gal drs, wks ................100 lb. | .70 | .80 | .80 | .70 |
| .05 | .05 | .04½ | .04½ | Silicofluoride, 450 lb bbls NY ......................lb. | .05½ | .05½ | .05½ | .05 |
| .49 | .48½ | .48½ | .48½ | Stannate, 100 lb drums....lb. | .41½ | .42 | .43 | .41½ |
| .29 | .18 | .20 | .20 | Stearate, bbls.............lb. | .25 | 29 | .29 | .25 |
| .18 | .16 | .16 | .16 | Sulfanilate, 400 lb bbls.....lb. | .16 | .18 | .18 | .16 |
| .02¾ | .02½ | .02½ | .02¼ | Sulfate Anhyd, 550 lb bbls c-1 wks..............lb. | .02½ | .02¾ | .02¾ | .02½ |
| .02¾ | .02½ | .02½ | .02¼ | Sulfide, 30% crystals, 440 lb bbls wks............lb. | .02½ | .02¾ | .02¾ | .02½ |
| .04 | .03½ | .03½ | 03½ | 62% solid, 650 lb drums 1c-1 wks............lb. | .03 | .03½ | .04 | .03½ |
| .03½ | .03¼ | .03¼ | .03¼ | Sulfite, crystals, 400 lb bbls wks................lb. | .03¼ | .03½ | .03½ | .03 |
| .50 | .40 | .40 | .40 | Sulfocyanide, bbls.........lb. | .28 | .35 | .76 | .28¾ |
| .85 | .80 | .85 | .80 | Tungstate, tech, crystals, kegs .......................lb. | ..... | .88 | 1.40 | .88 |
| .40 | .35 | .40 | .35 | Solvent Naphtha, 110 gal drs wks.................gal. | .35 | .40 | .40 | .35 |
| .01⅛ | .01⅛ | .01⅛ | .01⅛ | Spruce, 25% liquid, bbls.....lb. | ..... | .01⅛ | .01⅛ | .01⅛ |
| .01 | .01 | .01 | .01 | 25% liquid, tanks wks.....lb. | ..... | .01 | .01 | .01 |
| .02¼ | .02 | .02 | .02 | 50% powd, 100 lb bag wks lb. | .02 | .02¼ | .02¼ | .02 |
| 4.42 | 3.07 | 3.22 | 3.07 | Starch, powd., 140 lb bags ......................100 lb. | 3.92 | 4.12 | 4.12 | 3.82 |
| 4.32 | 2.97 | 3.12 | 2.97 | Pearl, 140 lb bags.....100 lb. | 3.82 | 4.02 | 4.02 | 3.72 |
| .06¾ | .05¾ | .06 | .04¾ | Potato, 200 lb bags........lb. | .05¾ | .06¼ | .06¾ | .05¾ |
| .06¾ | .05¾ | .06¼ | .06¼ | Imported bags..........lb. | .05¾ | .06¼ | .06¾ | .05¾ |
| .08½ | .08 | .08 | .06 | Soluble................lb. | .08 | .08½ | .08½ | 08 |
| .10 | .09½ | .09½ | .09 | Rice, 200 lb bbls..........lb. | .09½ | .10 | .10 | .09½ |
| .07 | .06½ | .06½ | .06½ | Wheat, thick bags.........lb. | .06½ | .07 | .07 | .06½ |
| .10 | .09½ | .09½ | .09½ | Thin bags..............lb. | .09½ | .10 | .10 | .09½ |
| .07½ | .07¼ | .07¼ | .07¼ | Strontium carbonate, 600 lb bbls wks....................lb. | .07¼ | .07½ | .07½ | .07¼ |
| .09 | .08¾ | .08¾ | .08 | Nitrate, 600 lb bbls NY....lb. | .09 | .09¼ | .09¼ | .08¾ |
| ..... | ..... | ..... | ..... | Peroxide, 100 lb drs.......lb. | ..... | 1.25 | 1.25 | 1.25 |

### Sulfur

| 1928 High | 1928 Low | 1927 High | 1927 Low | | Current Market | | 1929 High | 1929 Low |
|---|---|---|---|---|---|---|---|---|
| 2.05 | 2.05 | 2.05 | 2.05 | Sulfur Brimstone, broken rock, 250 lb bag c-1.......100 lb. | ..... | 2.05 | 2.05 | 2.05 |
| 19.00 | 18.00 | 18.00 | 18.00 | Crude, f. o. b. mines......ton | 18.00 | 19.00 | 19.00 | 18.00 |
| 2.40 | 2.40 | 2.40 | 2.40 | Flour for dusting 99½%, 100 lb bags c-1 NY....100 lb. | ..... | 2.40 | 2.40 | 2.40 |
| 2.50 | 2.50 | 2.50 | 2.50 | Heavy bags c-1......100 lb. | ..... | 2.50 | 2.50 | 2.50 |
| 3.45 | 3.45 | 3.45 | 3.45 | Flowers, 100%, 155 lb bbls c-1 NY..............100 lb. | ..... | 3.45 | 3.45 | 3.45 |
| 2.85 | 2.65 | 2.65 | 2.65 | Roll, bbls 1c-1 NY.....100 lb. | 2.65 | 2.85 | 2.85 | 2.65 |
| .05½ | .05 | .05 | .05 | Sulfur Chloride, red, 700 lb drs wks...................lb. | .05 | .05½ | .05½ | .05 |
| .04½ | .03½ | .03¾ | .03½ | Yellow, 700 lb drs wks.....lb. | .03½ | .04½ | .04½ | .03½ |
| .08½ | .08 | .08 | .08 | Sulfur Dioxide, 150 lb cyl....lb. | .08 | .08½ | .08½ | .08 |
| .19 | .17 | .17 | .17 | Extra, dry, 100 lb cyl......lb. | .17 | .19 | .19 | .17 |
| .65 | .10 | .65 | .65 | Sulfuryl Chloride, 600 lb dr...lb. | .10 | .65 | .65 | .10 |
| .11½ | .11 | .11 | .11 | Stainless, 600 lb bbls....lb. | .11 | .11½ | .11½ | .11 |
| .06 | .05½ | .05 | .05 | Extract, 450 lb bbls.......lb. | .05½ | .06 | .06 | .05½ |
| 130.00 | 130.00 | 130.00 | 130.00 | Sicily Leaves, 100 lb bg...ton | ..... | 130.00 | 130.00 | 130.00 |
| 72.00 | 72.00 | 80.00 | 72.00 | Ground shipment.......ton | ..... | 72.00 | 72.00 | 72.00 |
| 60.00 | 55.00 | 55.00 | 55.00 | Virginia, 150 lb bags......ton | 55.00 | 60.00 | 60.00 | 55.00 |
| 15.00 | 12.00 | 12.00 | 12.00 | Talc, Crude, 100 lb bgs NY...ton | 12.00 | 15.00 | 15.00 | 12.00 |
| 18.00 | 16.00 | 16.00 | 16.00 | Refined, 100 lb bgs NY..ton | 16.00 | 18.00 | 18.00 | 16.00 |
| 35.00 | 30.00 | 30.00 | 30.00 | French, 220 lb bags NY...ton | 20.00 | 25.00 | 25.00 | 20.00 |
| 45.00 | 38.00 | 38.00 | 38.00 | Refined, white, bags....ton | 38.00 | 45.00 | 45.00 | 38.00 |
| 50.00 | 40.00 | 40.00 | 40.00 | Italian, 220 lb bags NY...ton | 40.00 | 50.00 | 50.00 | 40.00 |
| 55.00 | 50.00 | 50.00 | 50.00 | Refined, white, bags....ton | 50.00 | 55.00 | 55.00 | 50.00 |
| | | | | Superphosphate, 16% bulk, wks....................ton | ..... | 9.50 | 10.00 | 9.00 |

# Prices Current and Comment

**Purchasing Power of the Dollar: 1926 Average--$1.00 - Jan. 1927 $1.042 - Jan. 1928 $1.047 - Nov. 1929 $1.076**

pounds, valued at $9,867,645 for the same period in 1928.

**Coconut Oil** — Although prices fell away somewhat during the middle of the past month, the closing weeks found a sort of steadiness returning to the market with the result that prices are now about at the same level as when last quoted.

**Cottonseed Oil** — Has been fairly steady during the greater part of the past month and as a result, prices are about at the same level as when last quoted. Department of Commerce issued the following report, covering the period from August 1 to October 31. Cottonseed: Received at mills, excluding reshipments 2,647,433 tons; crushed 1,507,619 tons. Production: Crude oil 461,120,812 pounds; refined 313,830,813 pounds; cake and meal 670,961 tons; hull 411,447 tons; linters 310,088 bales; hull fiber 14,691 bales. Stocks on hand October 31; Seed (at plants) 1,181,420 tons; Crude oil 121,341,282 pounds; refined 232,699,429 pounds. Increased imports by Canada from England was the cause of an enormous drop in cottonseed oil exports from the United States during the first nine months of 1929, according to the department. Within the last year, Canada's imports in cottonseed oil from England increased from 39,200 pounds to 4,768,600 pounds, while the exports in that commodity from the United States fell from 39,042,551 pounds to 16,544,81[illegible] pounds, it was stated. The receipts for exporting this oil from this country during the first nine months of this year were $2,000,000 lower than those of the same period last year. England has been raising more cotton to supply her needs and as a result has a vastly increased amount of cottonseed oil on hand. Due to the connections between the two countries, Canada would rather buy from England just so long as the latter's prices meet the competition of other countries. There has been recently an amalgamation of two of the largest consumers of cottonseed oil in Canada and as this group favors the buying of English products, there is little hope for an improvement in our exporting of this type oil to Canada.

**Linseed Oil** — Prices have declined decisively during the past month, and as a result, are 7 points lower than when last quoted. A rather steady business has been done on January to April shipments, but nothing as yet beyond that point due to crop uncertainties. The latest report from the Argentine indicates an exportable surplus of only 50 million bushels, an unusually short crop. Against these low crop reports, however, must be placed the reports of declining activity throughout the paint and varnish trade. There were

| 1928 High | 1928 Low | 1927 High | 1927 Low | | Current Market | 1929 High | 1929 Low |
|---|---|---|---|---|---|---|---|
| 5.10&10 | 4.65&10 | 4.85 | 4.00 | Tankage Ground NY.......unit | ..... | 4.25&10 | 4.50&10 4.00&10 |
| 4.80&10 | 3.90&10 | 5.25 | 3.75 | High grade f.o.b. Chicago.unit | ..... | 3.75&10 | 4.80&10 3.75&10 |
| 5.00&10 | 4.60&10 | 5.25 | 4.00 | South American cif.......unit | ..... | 4.35&10 | 4.80&10 4.35&10 |
| .05 | .04½ | .04½ | .04½ | Tapioca Flour, high grade bgs.lb. | .05½ | .05¾ | .05¾ .04½ |
| .04 | .03¾ | .03¾ | .03½ | Medium grade, bags.....lb. | .04½ | .04¾ | .04¾ .03¾ |
| .27 | .26 | .26 | .26 | Tar Acid Oil, 15%,drums....gal. | .26 | .27 | .27 .26 |
| .30 | .29 | .29 | .29 | 25% drums...........gal. | .29 | .30 | .30 .29 |
| .08 | .07 | .07 | .07 | Coke Oven, tanks wks.....lb. | .07 | .08 | .08 .07 |
| 13.50 | 13.50 | 16.00 | 13.50 | Kiln Burnt, bbl..........bbl. | ..... | 13.50 | 13.50 13.50 |
| 15.00 | 13.50 | 18.50 | 13.50 | Retort, bbls.............bbl. | 13.50 | 15.00 | 15.00 13.50 |
| 1.75 | 1.15 | 1.15 | 1.15 | Terra Alba Amer. No. 1, bgs or bbls mills.........100 lb. | 1.15 | 1.75 | 1.75 1.15 |
| 2.00 | 1.50 | 1.50 | 1.50 | No. 2 bags or bbls...100 lb. | 1.50 | 2.00 | 2.00 1.50 |
| .02½ | .02 | 2.00 | 2.00 | Imported bags........100 lb. | .02 | .02½ | .02½ .02 |
| ..... | ..... | ..... | ..... | Tetrachlorethane, 50 gal dr...lb. | .09 | .09½ | .09½ .09 |
| .20 | .20 | .20 | .20 | Tetralene, 50 gal drs wks.....lb. | ..... | .20 | .20 .20 |
| .24 | .22 | .22 | .22 | Thiocarbanilid, 170 lb bbl....lb. | .22 | .24 | .24 .22 |
| .17½ | .14½ | .20½ | .17½ | Tin Bichloride, 50% soln, 100 lb bbls wks..............lb. | ..... | .13½ | .14¾ .13½ |
| .41½ | .36½ | .48 | .41½ | Crystals, 500 lb bbls wks...lb. | .33 | .33½ | .38 .33 |
| .58 | .48 | .71½ | .58 | Metal Straits NY.........lb. | ..... | .42 | .48 .42 |
| .75 | 53 | .75 | .70 | Oxide, 300 lb bbls wks.....lb. | ..... | .46 | .56 .46 |
| .35½ | .30½ | .48 | .35¼ | Tetrachloride, 100 lb drs wks. ......................lb. | ..... | .27½ | .30½ .27½ |
| .40 | .40 | .40 | .40 | Titanium Dioxide 300 lb bbl..lb | .30 | .50 | .50 .24 |
| .14 | .13½ | .13½ | .13½ | Pigment, bbls...........lb. | .08½ | .09 | .14 .08½ |
| .45 | .40 | .40 | .40 | Toluene, 110 gal drs........gal. | ..... | .45 | .45 .45 |
| .45 | .35 | .35 | .35 | 8000 gal tank cars wks....gal. | ..... | .40 | .40 .40 |
| .94 | .90 | .90 | .90 | Toluidine, 350 lb bbls........lb. | .90 | .94 | .94 .90 |
| .32 | .31 | .31 | .31 | Mixed, 900 lb drs wks.....lb. | .31 | .32 | .32 .31 |
| .90 | .85 | .85 | .85 | Toner Lithol, red, bbls.......lb. | .90 | .95 | .95 .85 |
| .80 | .70 | .75 | .75 | Para, red, bbls............lb. | ..... | .80 | .80 .70 |
| 1.80 | 1.70 | 1.75 | 1.75 | Toluidine...................lb. | 1.50 | 1.55 | 1.55 1.50 |
| 3.90 | 3.60 | 3.60 | 3.60 | Triacetin, 50 gal drs wks.....lb. | 3.60 | 3.90 | 3.90 3.60 |
| ..... | ..... | ..... | ..... | Trichlorethylene, 50 gal dr...lb. | .10 | .10½ | |
| ..... | ..... | ..... | ..... | Triethanolamine, 50 gal drs...lb. | .55 | .60 | .60 .55 |
| .50 | .36 | .36 | .36 | Tricresyl Phosphate, drs.....lb. | .33 | .45 | .45 .33 |
| .73 | .69 | .70 | .69 | Triphenyl guanidine.........lb. | .58 | .60 | .70 .58 |
| .75 | .70 | .70 | .70 | Phosphate, drums.........lb. | .60 | .70 | .75 .60 |
| 3.00 | 2.50 | 2.50 | 2.50 | Tripoli, 500 lb bbls......100 lb. | 1.75 | 2.00 | 2.00 1.75 |
| .66½ | .50½ | .86 | .53½ | Turpentine Spirits, bbls.....gal. | .53 | .59 | .65 .51½ |
| .59 | .46 | .76 | .46 | Wood Steam dist. bbls....gal. | ..... | .50 | .57 .49 |
| .20 | .18 | .18 | .18 | Urea, pure, 112 lb cases......lb | .15 | .17 | .30 .15 |
| | | | | Fert. grade, bags c.i.f. ....ton | ..... | 101.00 | 101.00 98.00 |
| | | | | c. i. f. S. points..........ton | ..... | 102.30 | 102.30 99.30 |
| 76.00 | 55.00 | 70.00 | 66.00 | Valonia Beard, 42%, tannin bags.....................ton | ..... | 42.00 | 55.00 42.00 |
| 55.00 | 58.00 | 49.50 | 39.00 | Cups, 30-31% tannin.....ton | ..... | 30.00 | 35.00 30.00 |
| 64.00 | 45.00 | 68.00 | 43.00 | Mixture, bark, bags.......ton | ..... | 35.00 | 43.00 35.00 |
| 2.10 | 1.75 | 1.95 | 1.55 | Vermillion, English, kegs....lb.. | 2.00 | 2.05 | 2.05 2.00 |
| ..... | ..... | ..... | ..... | Vinyl Chloride, 16 lb cyl.....lb. | ..... | 1.00 | 1.00 1.00 |
| 76.00 | 49.75 | 59.00 | 49.50 | Wattle Bark, bags..........ton | 46.50 | 47.25 | 49.75 43.50 |
| .06½ | .05¾ | .05¾ | .05¾ | Extract 55%, double bags ex-dock.....................lb. | ..... | .06½ | .06½ .06½ |
| 1.25 | 1.25 | 1.25 | 1.25 | Whiting, 200 lb bags, c-1 wks ....................100 lb. | ..... | 1.25 | 1.25 1.25 |
| 13.00 | 13.00 | 13.00 | 13.00 | Alba, bags c-1 NY........ton | ..... | 13.00 | 13.00 13.00 |
| 1.35 | 1.35 | 1.35 | 1.35 | Gilders, bags c-1 NY...100 lb. | ..... | 1.35 | 1.35 1.35 |

## Zinc

| 1928 High | 1928 Low | 1927 High | 1927 Low | | Current Market | 1929 High | 1929 Low |
|---|---|---|---|---|---|---|---|
| .05½ | 5.85 | .06¼ | .06¼ | Zinc Ammonium Chloride powd., 400 lb bbls.........100 lb. | 5.25 | 5.75 | 5.75 | 5.25 |
| .10 | .09½ | .09½ | .09½ | Carbonate Tech, bbls NY..lb. | .10½ | .11 | .11 | .10½ |
| .06 | .06 | .06 | .06 | Chloride Fused, 600 lb drs. wks...................lb. | .05¾ | .06 | .06 | .05¾ |
| .06½ | .06½ | .06½ | .06½ | Gran., 500 lb bbls wks.....lb. | .06½ | .06½ | .06½ | .06½ |
| 3.00 | 3.00 | 3.00 | 3.00 | Soln 50%, tanks wks...100 lb. | ..... | 3.00 | 3.00 | 3.00 |
| .41 | .40 | .40 | .40 | Cyanide, 100 lb drums.....lb. | .40 | .41 | .41 | .40 |
| | | | | Dithiofuroate, 100 lb dr....lb. | ..... | 1.00 | 1.00 | 1.00 |
| .09 | .09 | .09 | .09 | Dust, 500 lb bbls c-1 wks...lb. | .09½ | .11 | .08¾ | .08½ |
| 6.40 | 6.07½ | 7.35 | 6.40 | Metal, high grade slabs c-1 NY...............100 lb. | ..... | 6.45 | 6.45 | 6.45¾ |
| .07¾ | .07¾ | .07¾ | .07¾ | Oxide, American bags wks..lb. | .07¾ | .07¾ | .07¾ | .07 |
| .12¾ | .10¾ | .10¾ | .10¾ | French, 300 lb bbls wks...lb. | .09¾ | .11¾ | .11¾ | .09¾ |
| ..... | ..... | ..... | ..... | Perborate, 100 lb drs......lb. | ..... | 1.25 | 1.25 | 1.25 |
| ..... | ..... | ..... | ..... | Peroxide, 100 lb drs........lb. | ..... | 1.25 | 1.25 | 1.25 |
| ..... | ..... | ..... | ..... | Stearate, 50 lb bbls........lb. | .25 | .26 | .26 | .25 |
| .03¾ | .03½ | .03½ | .03 | Sulfate, 400 bbl wks.......lb. | .03 | .03½ | .03¾ | .03 |
| .32 | .30 | .30 | .30 | Sulfide, 500 lb bbls........lb. | .30 | .32 | .32 | .30 |
| .30 | .29 | .29 | .29 | Sulfocarbolate, 100 lb keg..lb. | .29 | .30 | .30 | .29 |
| .32 | .32 | .38 | .32 | Xylene, 10 deg tanks wks...gal. | ..... | .33 | .33 | .33 |
| .32 | .30 | .36 | .30 | Commercial, tanks wks...gal. | .30 | .32 | .32 | .30 |
| .38 | .38 | .35 | .35 | Xylidine, crude.............lb. | ..... | .38 | .38 | .38 |
| .03 | .02½ | .02½ | .02½ | Zirconium Oxide, Nat. kegs..lb. | .02½ | .03 | .03 | .02½ |
| .50 | .45 | .45 | .45 | Pure kegs.................lb. | .45 | .50 | .50 | .45 |
| .10 | .08 | .08½ | .08 | Semi-refined kegs..........lb. | .08 | .10 | .10 | .08 |

## Oils and Fats

| 1928 High | 1928 Low | 1927 High | 1927 Low | | Current Market | 1929 High | 1929 Low |
|---|---|---|---|---|---|---|---|
| .14½ | .13 | .14 | .13 | Castor, No. 1, 400 lb bbls.....lb. | .13 | .13½ | .13½ | .13 |
| .14 | .12½ | .14 | .12½ | No. 3, 400 lb bbls.........lb. | .12½ | .13 | .13 | .12½ |
| .17 | .14 | .18 | .17 | Blown, 400 lb bbls.........lb. | .14 | .15 | .15 | .14 |
| .17 | .14½ | .31 | .13½ | China Wood, bbls spot NY...lb. | ..... | .15½ | .16 | .14¾ |
| .14¾ | .14¾ | .18 | .12½ | Tanks, spot NY.........lb. | .... | .13½ | .15 | .13¼ |
| .14¾ | .12¾ | ..... | ..... | Coast, tanks, Nov.......lb. | ..... | .12½ | .14½ | .12¾ |
| .11½ | .10¾ | .12 | .12 | Cocoanut, edible, bbls NY....lb. | ..... | .10¾ | .10¾ | .10¾ |
| .10 | .09¼ | .09¾ | .09 | Ceylon, 375 lb bbls NY....lb. | ..... | .08½ | .09¼ | .07¾ |
| .09 | .08¼ | .08¾ | .08 | 8000 gal tanks NY.......lb. | .07 | .07½ | .08¾ | .06¾ |
| .10½ | .09¼ | .10½ | .09½ | Cochin, 375 lb bbls NY....lb. | .08¾ | .09¼ | .10 | .09¼ |
| .09¾ | .08¾ | .10 | .08½ | Tanks NY...............lb. | ..... | .08½ | .09¼ | .08¾ |
| .10 | .08¼ | .09¾ | .08¼ | Manila, bbls NY...........lb. | ..... | .08½ | .09¼ | .07¾ |
| .08¾ | .08 | .08¾ | .08½ | Tanks NY...............lb. | .07 | .07½ | .08¾ | .06¾ |
| .08½ | .07¾ | .08¾ | .08 | Tanks, Pacific Coast.....lb. | .06¾ | .07 | .08 | .06¾ |


4
3
2




NICHOLS COPPER CO.
COPPER SULPHATE
(BLUE VITRIOL)
450 LBS.
NEW YORK
NICHOLS COPPER CO.
COPPER SULPHATE
(GRANULATED)
450 LBS.
NEW YORK
NICHOLS COPPER CO.
COPPER SULPHATE
(POWDERED)
350 LBS.
NEW YORK




20

# Prices Current and Comment

**Purchasing Power of the Dollar: 1926 Average--$1.00 - Jan. 1927 $1.042 - Jan. 1829 $1.047 - Nov. 1929 $1.076**

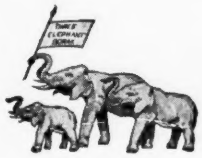
31 mills in the United States which crushed flaxseed during the quarter ended Sept. 30, 1929, reporting a crush of 284,638 tons of flaxseed and a production of 188, 769,427 pounds of linseed oil. These figures compare with 212,882 tons of seed crushed and 141,888,625 pounds of oil produced for the corresponding quarter in 1928, 253,431 tons of seed and 169,273,970 pounds of oil in 1927, and 265,995 tons of seed and 174,056,852 pounds of oil in 1926. Stocks of flaxseed at the mills on Sept. 30 1929, amounted to 89,220 tons compared with 103,206 tons for the same date in 1928, with 119,729 tons in 1927, and with 70,196 tons in 1926. Stocks of linseed oil reported by the crushers were 62,665,525 pounds on Sept. 30, 1929, compared with 78,623,882 pounds for the same date in 1928, with 76,563,440 pounds in 1927, and with 66,957,976 pounds in 1926. The imports of flaxseed during the quarter were 88,363 tons in 1929, compared with 106,571 tons in 1928, 119,347 tons in 1927, 107,360 tons in 1926. The imports of linseed oil were 39,545 pounds in 1929, compared with 35,138 in 1928, 113,088 in 1927, and 348,435 in 1926, while the exports were 510,637 in 1929, 512,339 in 1928, 530,829 in 1927 and 1,083,773 in 1926. Foreign trade for the three-quarters period of this year shows a phenomenal advance in imports and substantial gain of exports over same interval last year. The exceedingly large domestic demand for linseed oil is evidenced from the rise in total imports of 162,299 pounds, valued at $12,850 to 6,670,322 pounds, valued at $416,721 for this year. Comparative exports of the commodity for corresponding months of both years were, respectively, 1,493,740 pounds, valued at $172,752 and 1,546,726 pounds, for a total value of $182,984, according to the Department of Commerce.

**Perilla Oil** — Arrivements in good quantities at the Coast have influenced a slight downward trend in prices, coupled with some falling off in demand. Coast tanks are now at 13c lb., while barrels in New York are at 16c lb.

**Rapeseed Oil** — Lack of demand has made itself felt already in this market with the result that prices on both English and Japanese are off somewhat, the former being quoted at 82c gal., and the latter at 72c gal.

**Soy Bean Oil** — As the new crop is now available, prices have fallen off considerably since last quoted. Domestic oil is now quoted at 9¼c lb. in tanks at the mills. This precludes the possibility of any great sale of imported oil which is being quoted at 9¾c lb. in tanks at the Coast.

| 1928 High | 1928 Low | 1927 High | 1927 Low | | Current Market | | 1929 High | 1929 Low |
|---|---|---|---|---|---|---|---|---|
| .69 | .63 | .66 | .63 | Cod, Newfoundland, 50 gal bbls ........gal. | ..... | .57½ | .64 | .57½ |
| .63 | .60 | .59 | .59 | Tanks NY ........lb. | ..... | .60 | .60 | .60 |
| | | | | Cod Liver see Chemicals ........ | | | | |
| .06½ | .05½ | .06 | .06 | Copra, bags ........lb. | ..... | .044 | .05½ | .042 |
| .11 | .10 | .11 | .07 | Corn, crude, bbls NY ........lb. | ..... | .09¾ | .10¾ | .09½ |
| .10 | .08¾ | .09¾ | .07 | Tanks, mills ........lb. | ..... | .08 | .09¾ | .07⅞ |
| .12¾ | .11¾ | .14 | .10½ | Refined, 375 lb bbls NY....lb. | ..... | .10½ | .11¾ | .10¼ |
| .11½ | .10¾ | .12 | .11 | Tanks ........lb. | ..... | .09½ | .11 | .09 |
| .09½ | .07¾ | .09½ | .06½ | Cottonseed, crude, mill ........lb. | ..... | .07⅞ | .09 | .08½ |
| 10.65 | .09½ | .11½ | .08 1/5 | PSY 100 lb bbls spot ........lb. | ..... | .09 | .1075 | .09 |
| 10.75 | .09½ | ..... | ..... | Nov.—Jan. ........lb. | ..... | .092 | .1080 | .093 |
| .05 | .04½ | .04½ | .04½ | Degras, American, 50 gal bbls NY ........lb. | .04½ | .05 | .05 | .04½ |
| .05¾ | .04½ | .04¾ | do | English, brown, bbls NY....lb. | ..... | .05¾ | .05¾ | .05¾ |
| .05¾ | .05½ | .05½ | .05½ | Light, bbls NY ........lb. | ..... | .05¾ | .05¾ | .05¾ |
| | | | | **Greases** | | | | |
| .08½ | .07 | .07½ | .06 | Greases, Brown ........lb. | ..... | .06½ | .08½ | .06 |
| .08½ | .07 | .08 | .06½ | Yellow ........lb. | ..... | .07½ | .08½ | .06½ |
| .11 | .09½ | .10¾ | .08¾ | White, choice bbls NY....lb. | ..... | .08½ | .11½ | .07½ |
| .42½ | .40 | ..... | ..... | Herring, Coast, Tanks ........gal. | ..... | Nom. | | |
| Nom. | .09½ | .09½ | .09 | Horse, bbls ........lb. | .09½ | Nom. | Nom. | ..... |
| .16½ | .15½ | .16¾ | .14¾ | Lard Oil, edible, prime ........lb. | ..... | .15½ | .15¾ | .14¾ |
| .13½ | .12 | .13¾ | .10¾ | Extra, bbls ........lb. | ..... | .12½ | .13½ | .12 |
| .13 | .11 | .12½ | .10½ | Extra No. 1, bbls ........lb. | ..... | .12 | .13½ | .11¾ |
| 10.8 | 10.0 | .11 4/5 | .10 2/5 | Linseed, Raw, five bbl lots...lb. | ..... | .152 | .162 | .105 |
| 10.4 | 9.6 | .11 9/10 | .09 6/10 | Bbls c-1 spot ........lb. | ..... | .148 | .158 | .101 |
| 9.6 | 8.8 | .10½ | .09 | Tanks ........lb. | ..... | .14 | .15 | .093 |
| .09¾ | .09¾ | .09¾ | .09¾ | Lumbang, Coast ........lb. | ..... | .09¾ | .09¾ | .09¾ |
| .48 | .40 | .47½ | .44 | Menhaden Tanks, Baltimore.gal. | ..... | .50 | .52 | .45 |
| .09 | .09 | .90 | .10 | Blown, bbls NY ........lb. | ..... | .09 | .09 | .09 |
| .70 | .67 | .70 | .67 | Extra, bleached, bbls NY..gal. | ..... | .70 | .70 | .70 |
| .64 | .63 | .66 | .63 | Ligh, pressed, bbls NY....gal. | .63 | .64 | .64 | .63 |
| .67 | .66 | .66 | .69 | Yellow, pressed, bbls NY..gal. | .66 | 67 | .67 | .66 |
| .60 | .40 | ..... | ..... | Mineral Oil, white, 50 gal bbls ........gal. | .40 | .60 | ·.60 | .40 |
| 1.00 | .95 | ..... | ..... | Russian, gal ........gal. | .95 | 1.00 | 1.00 | .95 |
| .19 | .18½ | .18¾ | .14½ | Neatsfoot, CT, 20° bbls NY .lb. | ..... | .18½ | .19 | .18½ |
| .13½ | .12 | .13½ | .10½ | Extra, bbls NY ........lb | .. .. | .12½ | .13½ | .12 |
| .16½ | .15½ | .16¾ | .12½ | Pure, bbls NY ........lb. | ..... | .14½ | .15½ | .13½ |
| .17¾ | .11¾ | .18½ | .10 | Oleo, No. 1, bbls NY ........lb. | ..... | .11½ | .11½ | .10¾ |
| .15½ | .11 | .17 | .08¾ | No. 2, bbls NY ........lb. | ..... | .10½ | .11½ | .10 |
| .14 | .10 | .14 | .08½ | No. 3, bbls NY ........lb. | .... | .10 | .10½ | .09¾ |
| 1.40 | 1.18 | 1.75 | 1.40 | Olive, denatured, bbls NY...gal. | 1.05 | 1.15 | 1.40 | 1.05 |
| 2.00 | 1.75 | 2.00 | 2.45 | Edible, bbls NY ........gal. | 1.95 | 2.00 | 2.00 | 1.95 |
| .11 | .09⅝ | .10½ | .08¾ | Foots, bbls NY ........lb. | .08⅛ | .08⅝ | .11½ | .08⅛ |
| .09½ | .08½ | .09½ | .09 | Palm, Kernel, Casks ........lb. | ..... | .08½ | .09 | .08 |
| .09¾ | .07¾ | .08¾ | .07½ | Lagos, 1500 lb casks ........lb. | ..... | .07¾ | .09 | .07½ |
| .08¾ | .07 | .08½ | .07½ | Niger, Casks ........lb. | ..... | .07½ | .08¾ | .07 |
| .12½ | .12 | .14½ | .12 | Peanut, crude, bbls NY ........lb. | ..... | Nom | Nom. | ..... |
| .17 | .14½ | .15½ | .14½ | Refined, bbls NY ........lb. | . 4½ | 15 | .15 | .14½ |
| .21 | .13 | .16½ | .12½ | Perilla, bbls NY ........lb. | ..... | .16 | .20 | .15 |
| .15½ | .10½ | .14½ | .10 | Tanks, Coast ........lb. | ..... | .13 | .15⅝ | .13 |
| 1.75 | 1.70 | 1.70 | 1.70 | Poppyseed, bbls NY ........gal. | 1.70 | 1.75 | 1.75 | 1.70 |
| 1.06 | 1.01 | 1.05 | 1.00 | Rapeseed, blown, bbls NY...gal. | 1.04 | 1.04 | 1.04 | 1.04 |
| .92 | .83 | .90 | .82 | English, drms. NY ........gal. | ..... | .82 | .90 | .82 |
| .90 | .81 | .85 | .76 | Japanese, drms. NY ........gal. | ..... | .72 | .88 | .72 |
| .10⅝ | .09½ | .10 | .09 | Red, Distilled, bbls ........lb. | .10⅝ | .11⅛ | .11½ | .10½ |
| .09½ | .08 | .09½ | .08½ | Tanks ........lb. | ..... | .09¾ | 10½ | .09½ |
| .5c | .42 | .50 | .50 | Salmon, Coast, 8000 gal tks..gal. | .42 | .44 | .44 | .42 |
| .50 | .41 | .47 | .43 | Sardine, Pacific Coast tks...gal. | ..... | .47 | .51 | .45 |
| .13½ | .12 | .13 | .11½ | Sesame, edible, yellow, dos...lb. | .11½ | .12 | .12 | .11½ |
| .15 | .12½ | .14 | .14 | White, dos ........lb. | .12½ | .12½ | .12½ | .12½ |
| .40 | .40½ | .40 | .40 | Sod, bbls NY ........gal.. | ..... | .40 | .40 | .40 |
| ..... | ..... | .09⅝ | .09½ | Soy Bean, crude ........ | | | | |
| .09¾ | .09 | ..... | ..... | Pacific Coast, tanks ........lb. | ..... | .09¾ | .10⅞ | .09 |
| | | | | Domestic tanks, f.o.b. mills, ........lb. | ..... | .09¼ | .10½ | .08½ |
| .12½ | .12 | .12½ | .10¾ | Crude, bbls NY ........lb. | ..... | .11¾ | .12¾ | .11¹ |
| .10¾ | .10½ | .11 | .10½ | Tanks NY ........lb. | ..... | .10½ | .11½ | .10½ |
| .13¾ | .13¾ | .13 | .12 | Refined, bbls NY ........lb. | .13½ | .13½ | .13½ | .13½ |
| .85 | .84 | .85 | .84 | Sperm, 38° CT, bleached, bbls NY ........gal. | .84 | .85 | .85 | .84 |
| .80 | .79 | .82 | .79 | 45° CT, bleached, bbls NY gal. | .79 | .80 | .80 | .79 |
| .18½ | .11 | .13½ | .11½ | Stearic Acid, double pressed dist bags ........lb. | .15¾ | .16½ | .18½ | .15½ |
| .19 | .11½ | .14 | .11½ | Double pressed saponified bags ........lb. | .16¼ | .16¾ | .19 | .15¾ |
| .20½ | .13½ | .15½ | .13½ | Triple, pressed dist bags..lb | .18¼ | .18¾ | 20½ | .17¾ |
| .12½ | .09½ | .13 | .08¾ | Stearine, Oleo, bbls ........lb. | .10⅝ | .10⅞ | .12 | .09¾ |
| .09½ | .08½ | .09 | .07½ | Tallow City, extra loose ........lb. | ..... | .08¼ | .08⅝ | .07 |
| .10¾ | .09¾ | .11 | .08½ | Edible, tierces ........lb. | .09 | .09¼ | .10½ | .08 |
| .12¾ | .11¾ | .10¾ | .08½ | Tallow Oil, Bbls, c-1 NY...lb. | ..... | .11 | .12 | .10¾ |
| .11¾ | .10¾ | .12¾ | .10 | Acidless, tanks NY ........lb. | ..... | .10 | .11 | .09⅞ |
| Nom. | .08 | .08⅝ | .07½ | Vegetable, Coast mats ........lb. | .08 | Nom. | Nom. | .08 |
| .11 | ..... | .11 | .11 | Turkey Red, single bbls ........lb. | .11 | .12 | .12 | .11 |
| .16 | .14 | .14 | .14 | Double, bbls ........lb. | .14 | .16 | .16 | .14 |
| .80 | .78 | .78 | .78 | Whale, bleached winter, bbls NY ........gal. | .78 | .80 | .80 | .78 |
| .82 | .80 | .80 | .80 | Extra, bleached, bbls NY..gal. | .80 | .82 | .82 | .80 |
| .78 | .76 | .76 | .76 | Nat. winter, bbls NY....gal. | .76 | .78 | .78 | .76 |



# The Chemical Market-Place

## WANTS & OFFERS

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Large chemical manufacturing company has unusual opportunity for chemist or chemical engineer who has specialized in such economic investigations as market surveys, process cost studies, and plant location studies. Sound working knowledge of economics and business principles is essential. Ability to express results in writing clearly and forcefully is equally essential. This is not a job which can be filled by a statistician; nor by a chemist who would like to "try something else." Only high-grade men of experience will be considered. Box 860 CHEMICAL MARKETS.

YOUNG SALESMAN wanted by large manufacturer of heavy chemicals for New York territory; experienced and with technical knowledge; college graduate preferred. Box 844, CHEMICAL MARKETS.

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CHEMIST with experience who knows his profession and works, to connect with a newly formed manufacturing company. Good salary to the right man with an excellent opportunity for advancement. Box 854, CHEMICAL MARKETS.

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Expert in the manufacturing of flavoring extracts, syrups, supplies and specialties for the confectionery, bakery, bottle and soda found trades. Can match new products or the well-known brands in the market and beat competition. Can help create sales and improve business. Services were of value to other well-known firms. Box 859, CHEMICAL MARKETS.

Progressive, capable, executive, purchasing agent, office manager and correspondent desires connection—leather, textile lines or associated industries. Box 853, CHEMICAL MARKETS.

CHEMIST—Colored, desires position as laboratory helper. Toilet articles, textiles, silk, paper, industrial designing processes, specialties etc. Box 852. CHEMICAL MARKETS.

JUNIOR EXECUTIVE, university graduate, 26 years desirous of assuming responsible position with large reputable chemical organization where the combination of ability, conscientiousness and a pleasing personality will be recognized. Seven years experience in the research industrial field. Can furnish excellent references. Presently employed and available immediately. Box 848, CHEMICAL MARKETS.

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FOR SALE—Used copper equipment, rebuilt throughout, guaranteed the same as new. Vacuum Pans 6 ft., 5 ft., 4 ft., 3 ft., and 2 ft. diameter. Vacuum Stills 5 ft., 4 ft., and 3 ft. diameter. Rectifying columns 60-inch, 36-inch, 24-inch and 18-inch diameter. Jacketed kettles, various sizes. IT TAKES A COPPERSMITH TO REBUILD COPPER EQUIPMENT. Send us your inquiries for used or new equipment. We buy or take in trade used equipment. Acme Coppersmithing & Machine Co., Berks-Hancock-Palethorp Sts., Philadelphia, Pa.

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**Warehouse Space for Rent**
Downtown New York Drug & Chemical firm will rent 1-2 floors in their warehouse with service—electric elevator. Out of town manufacturers desirous of carrying stocks in lower New York should be interested. Box 801, Chemical Markets.

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## Surplus Stocks

We pay cash for Surplus, discontinued, rejected stocks of chemicals—solvents—oils—gums—waxes—colors—drugs and waste materials. What have you to offer? Chemical Clearing House, Spring St., Newark, N. J.

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## *Index To Advertisers*

## Index To Advertisers

# "WE"—Editorially Speaking

J. B. Churchill, author of the article on chemical refrigerants, is a consulting chemical engineer. He is a graduate of Harvard University who entered the teaching of chemistry at Pennsylvania State College in 1899. He was made a Professor of Industrial Chemistry at that college in 1911, and at the same time granted a leave of absence of two years to pursue further studies in Europe. This time was spent at the University of Goettingen in organic research in essential oils. In 1914, he accepted the British American Chemical Fellowship in organic chemical research in the Mellon Institute. From 1916 to 1918 he was director, National Association of Tanners' Research Laboratory, and from 1918 to 1921, technical director, British American Chemical Co. Since 1922, he has been consulting chemist and chemical engineer, chiefly for companies engaged in the manufacture of chemical refrigerants and chemical refrigerating machines.

The Edeleanu Process is described for us by Robert L. Brandt, Dr. Edeleanu's technical assistant. This is one of the major contributions to petroleum chemistry which has been made during recent years. In the United States, the process is in use in California, Texas and on the East Coast for both kerosene and lubricating oil refining. Foreign plants are located in South America, Europe, Persia, and in the Dutch East Indies. Practically every major source of crude oil is handled by this process.

Such is fame—our Contributing Editor Arthur D. Little, was described the other week by *The New Yorker* as "chemist of Manchester, England." Just see what travel does for one. *The Bostonian* please copy.

Kenneth H. Klipstein, who writes of what is perhaps the most talked of chemical of the past six months, anhydrous aluminum chloride, is treasurer, E. C. Klipstein & Co. He was educated at Princeton University and took his M. A. there in 1924. He is a member of the American Chemical Society, the Essex County Country Club, the Princeton Club (New York), and the Cannon Club, Princeton University.

## THE YEAR IN REVIEW

**An international review of chemical business during the past year will feature the pages of our January issue. In addition to a staff review of developments in our own country, the following distinguished contributors will discuss the economic progress of the chemical industry of their respective countries.**

**M. D. Curwen, Editor**
**Industrial Chemist, London;**

**Dr. W. Roth, Editor,**
**Chemiker-Zeitung, Berlin;**

**J. Debuigne, Editor,**
**Revue des Produits Chimiques, Paris;**

**Dr. Massimo Treves, Editor,**
**L'Industria Chimica, Rome.**

**This far-reaching review of the year's developments in chemical economics will present the readers of CHEMICAL MARKETS with a comprehensive survey on an international scale of the past year's contributions to chemical industry in the principal chemical producing centers of the world.**

On "Awful Thursday" the president of a large fertilizer company which has chemical affiliations and aspirations, took a scion of the Grasselli house (in Baltimore on his honeymoon) to lunch in the grill of a hotel famous for its oyster bar. They were hardly seated when a bellowing bellboy began shouting, "Calling Mr. Miller." This raised a sad smile among the little groups of doleful bankers and brokers lunching all about, so that our host gently remonstrated, explaining to the page that while stocks were declining precipitously it would be more diplomatic to avoid such fateful words and to announce that Mr. Miller was wanted at the telephone. As they were selecting a pastry, the same boy appeared at the door and yelled, "Calling, Mr. ——" then he remembered and stopped short, but not until three bank presidents had half risen in their seats. He continued, "New York calling—" Again he stopped. A visible shiver went 'round the crowded dining room. "Mr. Miller on the telephone, please."

William H. Zinsser, who discusses India's contribution of shellac, graduated from Princeton University in 1909. Since 1910, he has been president, William Zinsser & Co. He is a member of the University Club and of the Princeton Club (New York) and ex-president of both the United States Shellac Importers' Association and the American Bleached Shellac Manufacturers' Association.

Mr. Miller's statement in "Plant Safety Organization" that at present the trend of accidents is upward, will probably come as a surprise to most chemical executives. Problems of accident prevention continue to multiply so rapidly that too much emphasis cannot be placed upon safety work in the plant.